ARL-SR-0366 ● Nov 2016

US Army Research Laboratory

Dynamically Allocated Virtual Clustering Management System User's Guide

by Kelvin M Marcus

NOTICES

Disclaimers

The findings in this report are not to be construed as an official Department of the Army position unless so designated by other authorized documents.

Citation of manufacturer's or trade names does not constitute an official endorsement or approval of the use thereof.

Destroy this report when it is no longer needed. Do not return it to the originator.

ARL-SR-0366 ● NOV 2016

US Army Research Laboratory

Dynamically Allocated Virtual Clustering Management System User's Guide

by Kelvin M Marcus
Computational and Information Sciences Directorate, ARL

REPORT DOCUMENTATION PAGE			Form Approved OMB No. 0704-0188

1. REPORT DATE *(DD-MM-YYYY)*	2. REPORT TYPE	3. DATES COVERED (From - To)
November 2016	Special Report	10/2015–09/2016

4. TITLE AND SUBTITLE	5a. CONTRACT NUMBER
Dynamically Allocated Virtual Clustering Management System User's Guide	5b. GRANT NUMBER
	5c. PROGRAM ELEMENT NUMBER
6. AUTHOR(S)	5d. PROJECT NUMBER
Kelvin M Marcus	5e. TASK NUMBER
	5f. WORK UNIT NUMBER
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES)	8. PERFORMING ORGANIZATION REPORT NUMBER
US Army Research Laboratory ATTN: RDRL-CIN-T 2800 Powder Mill Road Adelphi, MD 20783-1138	ARL-SR-0366
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES)	10. SPONSOR/MONITOR'S ACRONYM(S)
	11. SPONSOR/MONITOR'S REPORT NUMBER(S)

12. DISTRIBUTION/AVAILABILITY STATEMENT

Approved for public release; distribution unlimited.

13. SUPPLEMENTARY NOTES

14. ABSTRACT

The Dynamically Allocated Virtual Clustering Management System (DAVC) is an experimentation infrastructure that provides the means to dynamically create, deploy, and manage virtual clusters of heterogeneous nodes within a cloud computing environment. The system allows researchers to create virtual clusters of nodes that can be used for experimentation, software development, and integration with existing hardware and software. This report provides usage instructions for the DAVC version 2.0 web application.

15. SUBJECT TERMS

DAVC, Dynamically Allocated Virtual Clustering Management System, network emulation, testbed, computer infrastructure

16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT	18. NUMBER OF PAGES	19a. NAME OF RESPONSIBLE PERSON
a. REPORT	b. ABSTRACT	c. THIS PAGE			Kelvin M Marcus
Unclassified	Unclassified	Unclassified	UU	38	19b. TELEPHONE NUMBER (Include area code) 301-394-5637

Standard Form 298 (Rev. 8/98)
Prescribed by ANSI Std. Z39.18

Contents

INTENTIONALLY LEFT BLANK.

1. Introduction

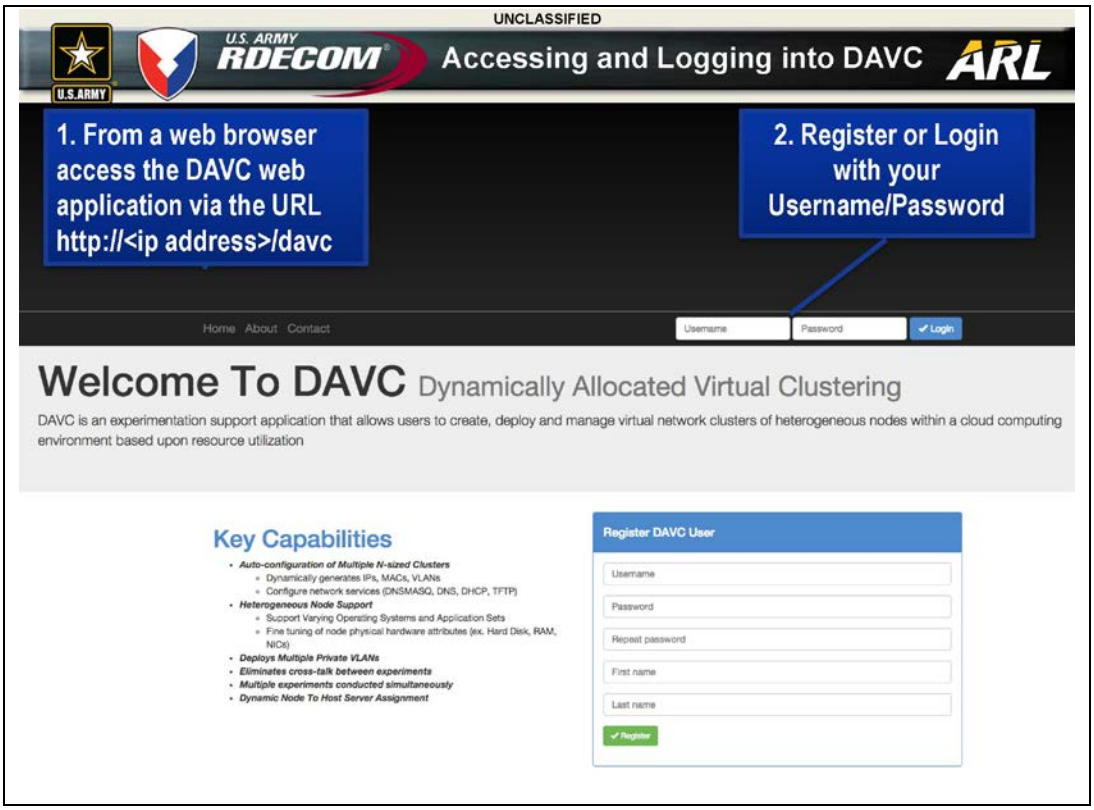
The Dynamically Allocated Virtual Clustering Management System (DAVC) is an experimentation infrastructure that provides the means to dynamically create, deploy, and manage virtual clusters of heterogeneous nodes within a cloud computing environment. The system allows researchers to create virtual clusters of nodes that can be used for experimentation, software development, and integration with existing hardware and software. This report provides usage instructions for the DAVC version 2.0 web application.

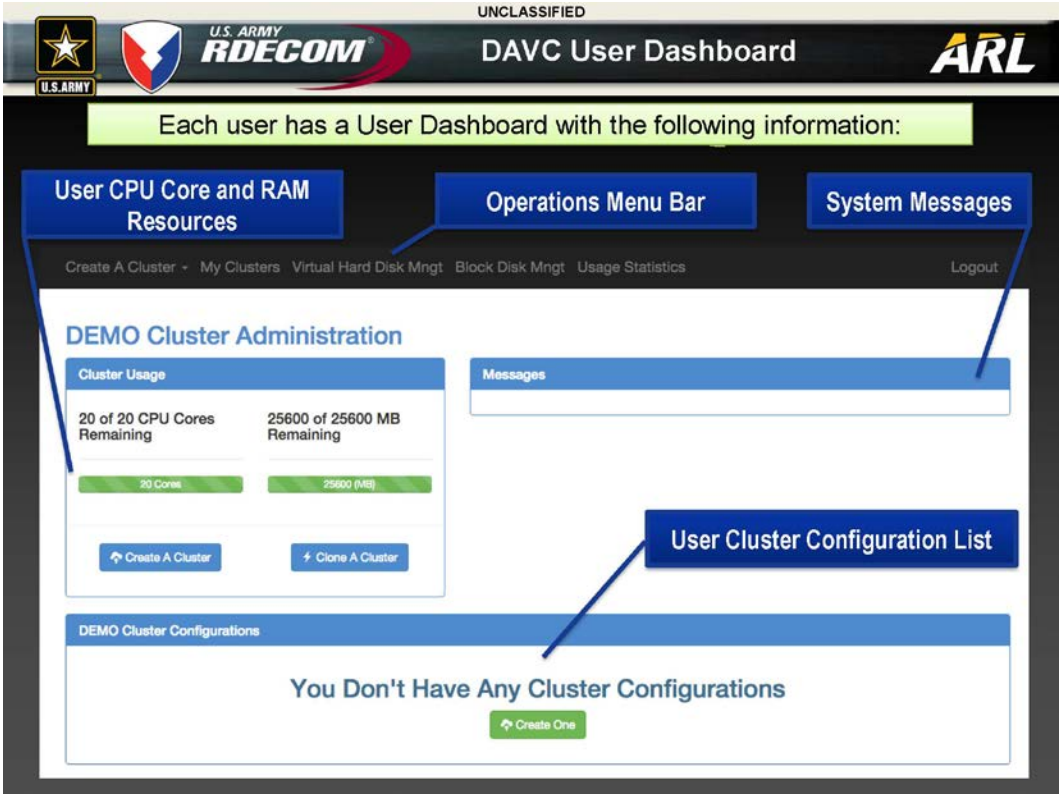
This report is separated into the following sections, which detail, via examples and step-by-step instructions, actions the user will perform when using DAVC version 2.0:

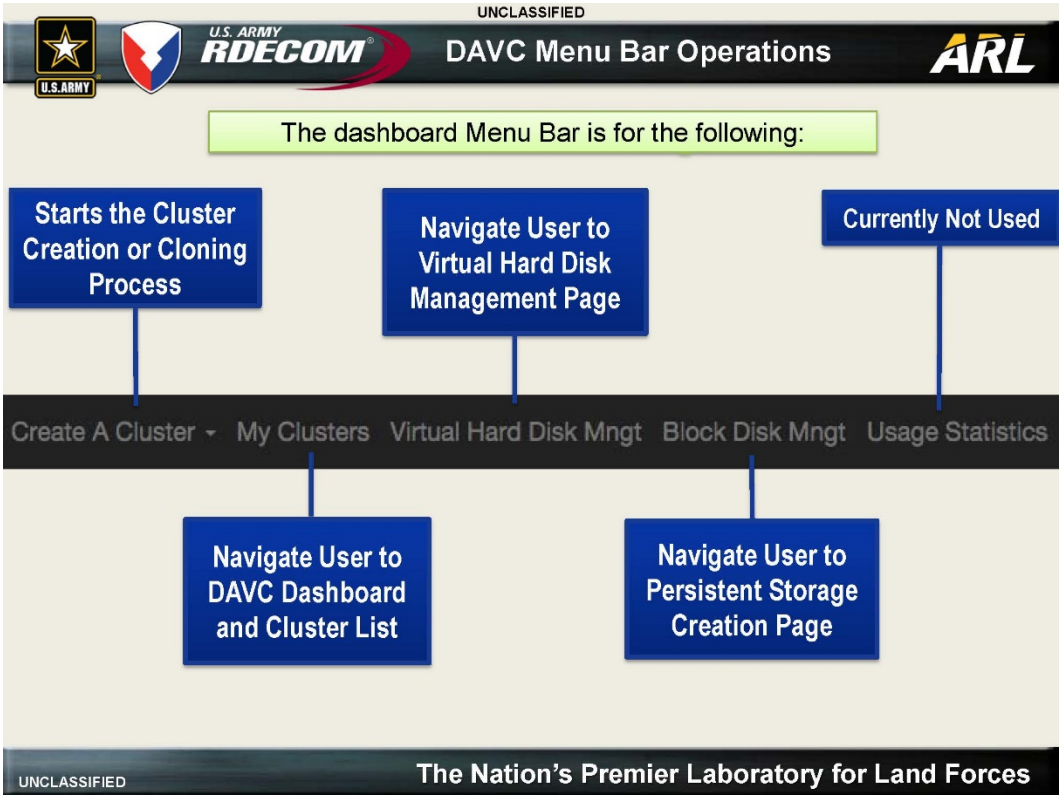
1) Accessing and logging into DAVC
2) DAVC cluster configuration
3) DAVC cluster instantiation
4) DAVC cluster and node details
5) DAVC virtual hard disk management
6) DAVC block disk/persistent storage management
7) Creating a new virtual hard disk from a cluster node

Each section contains slides from a PowerPoint presentation on using DAVC version 2.0. The slides are presented without change from the original version or additional comment.

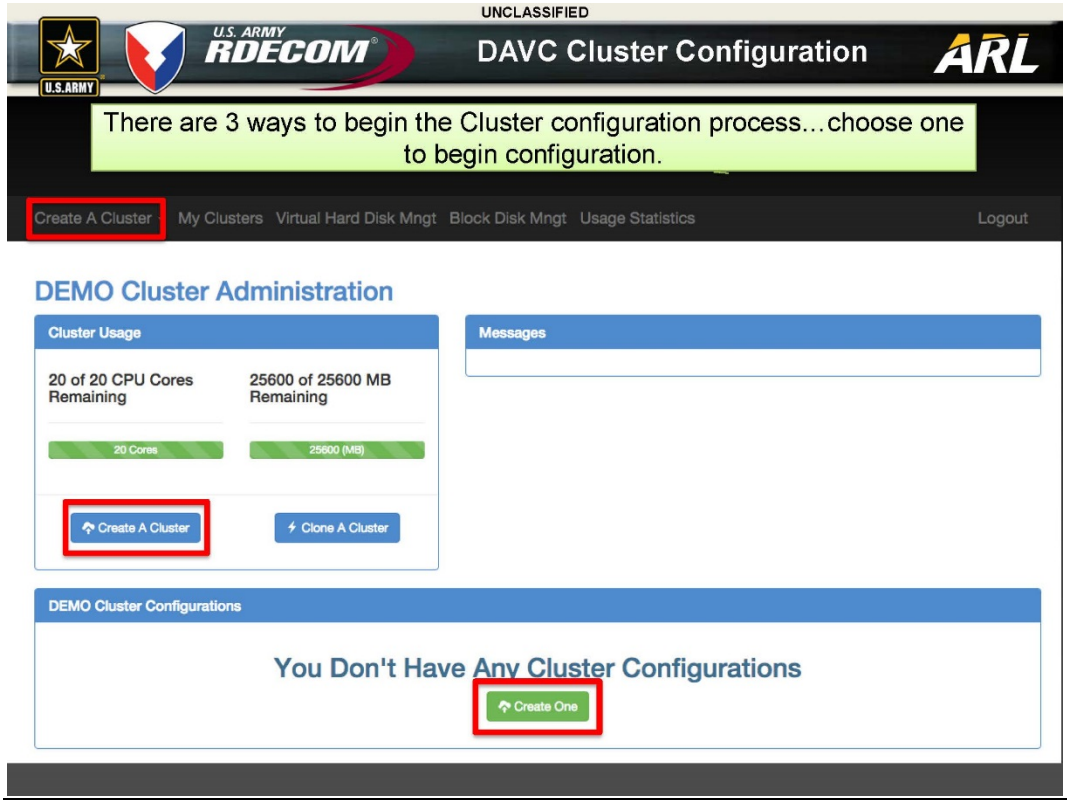
2. Accessing and Logging into DAVC

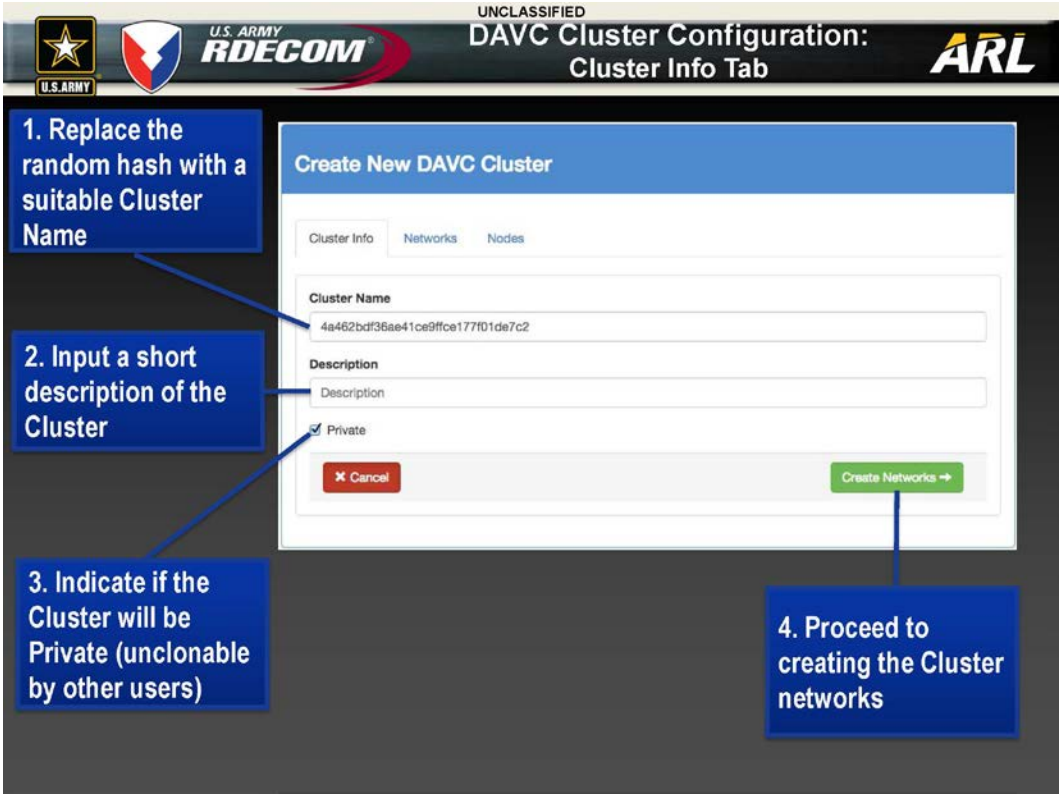


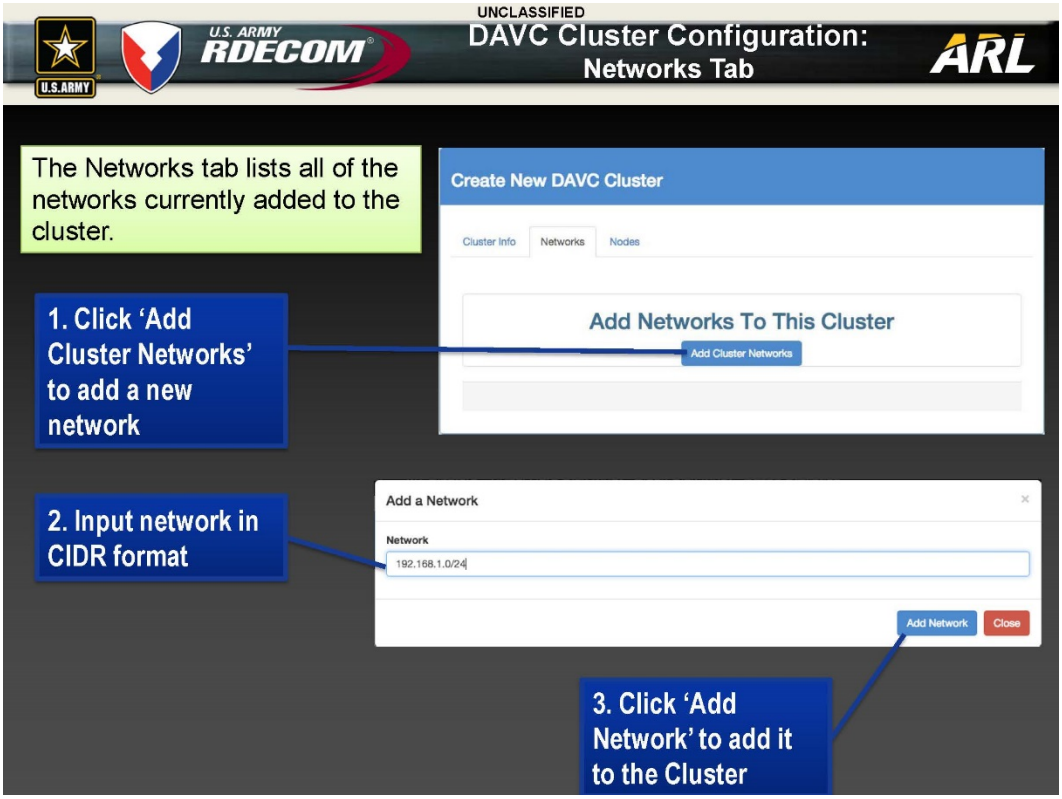

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC User Dashboard
ARL
Each user has a User Dashboard with the following information:
User CPU Core and RAM Resources
Operations Menu Bar
System Messages
Create A Cluster
My Clusters
Virtual Hard Disk Mngt
Block Disk Mngt
Usage Statistics
Logout
DEMO Cluster Administration
Cluster Usage
20 of 20 CPU Cores Remaining
25600 of 25600 MB Remaining
20 Cores
25600 (MB)
Create A Cluster
Clone A Cluster
Messages
User Cluster Configuration List
DEMO Cluster Configurations
You Don't Have Any Cluster Configurations
Create One

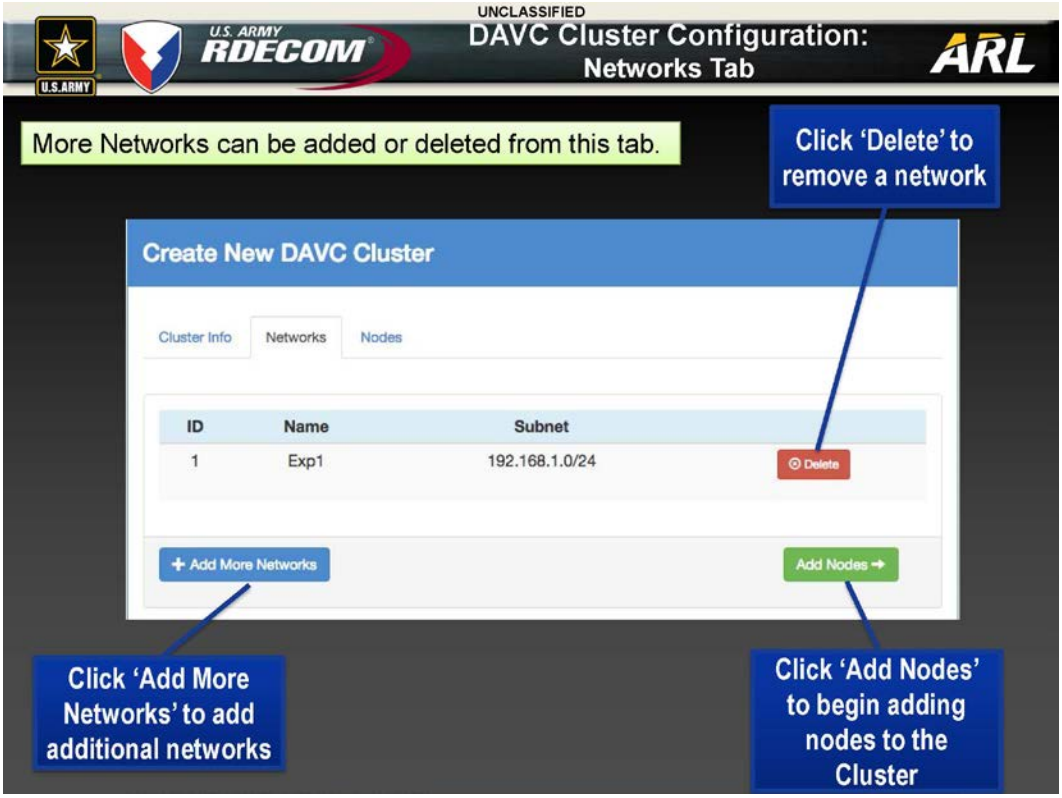

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Menu Bar Operations
ARL
The dashboard Menu Bar is for the following:
Starts the Cluster Creation or Cloning Process
Navigate User to Virtual Hard Disk Management Page
Currently Not Used
Create A Cluster
My Clusters
Virtual Hard Disk Mngt
Block Disk Mngt
Usage Statistics
Navigate User to DAVC Dashboard and Cluster List
Navigate User to Persistent Storage Creation Page
UNCLASSIFIED
The Nation's Premier Laboratory for Land Forces

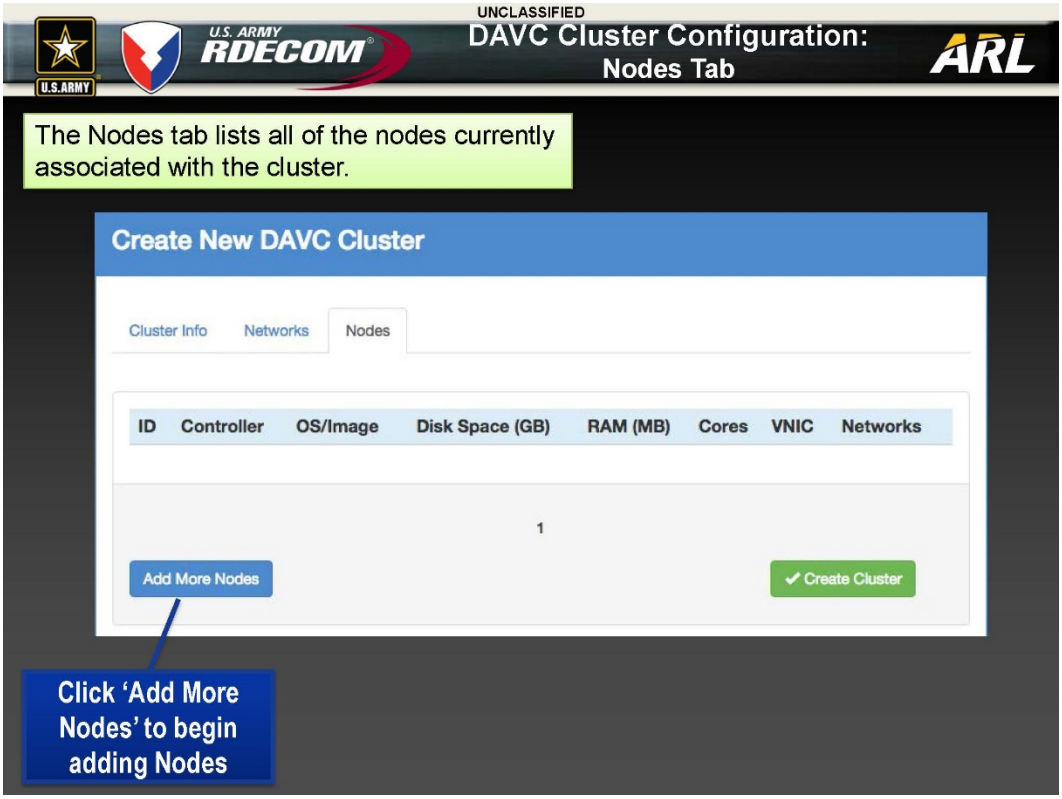
3. DAVC Cluster Configuration

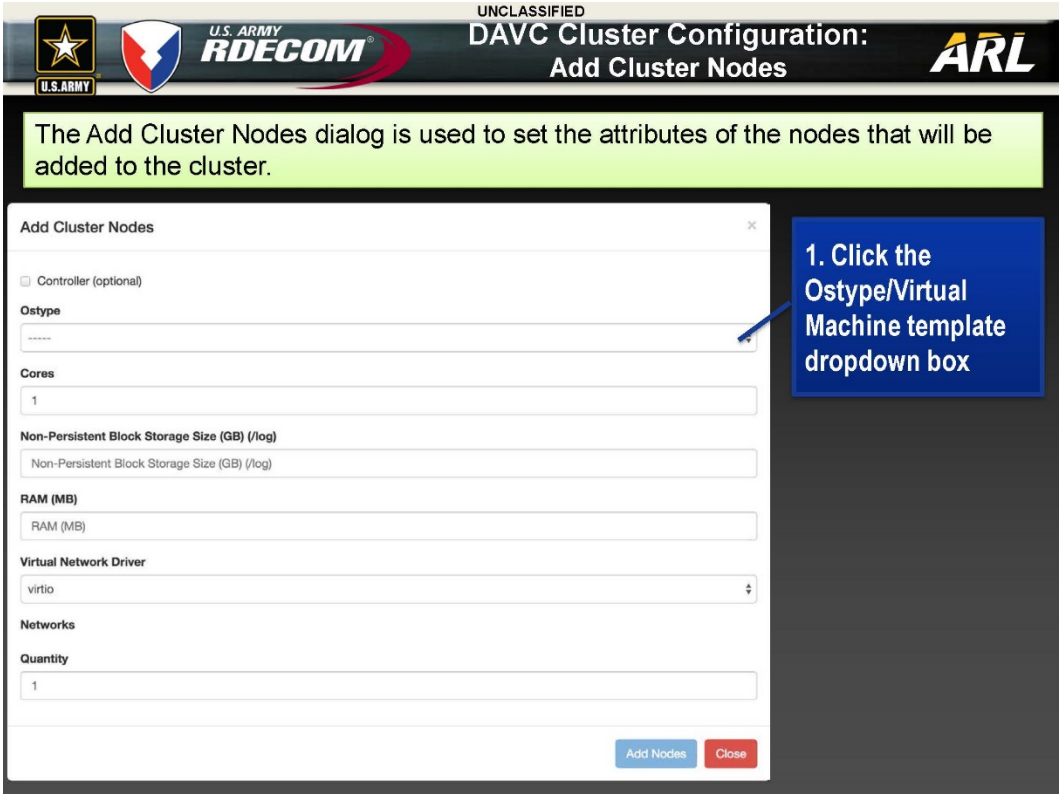


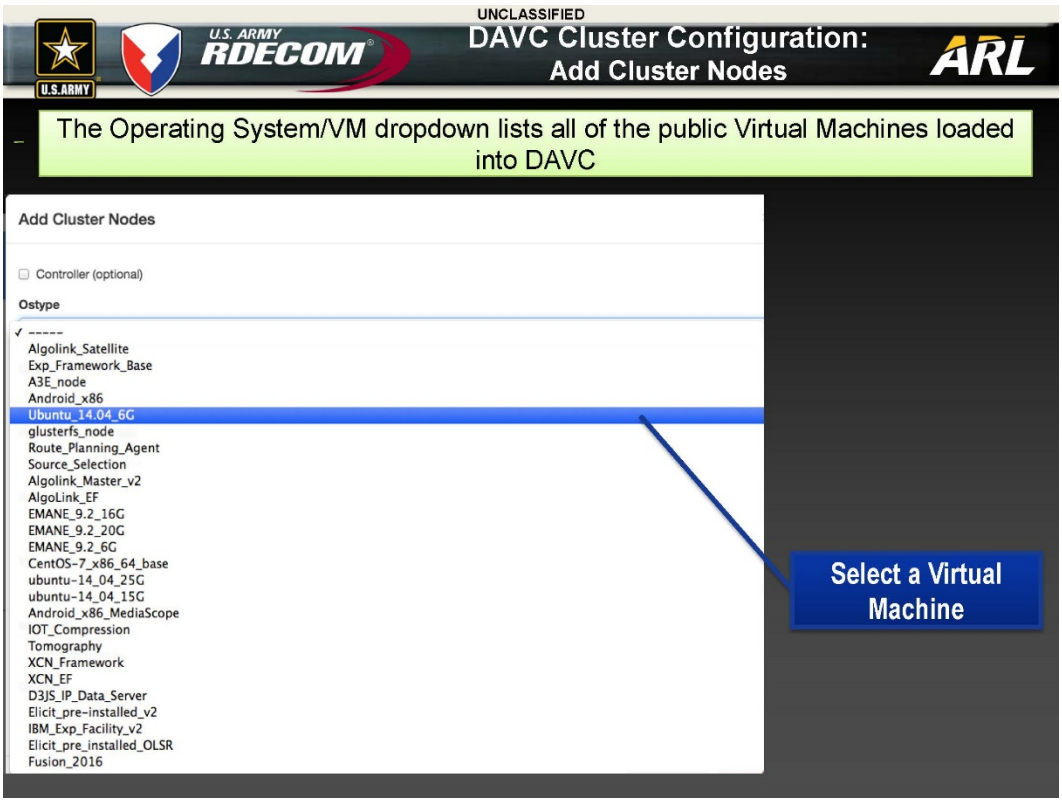

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Cluster Info Tab
ARL
1. Replace the random hash with a suitable Cluster Name
2. Input a short description of the Cluster
3. Indicate if the Cluster will be Private (unclonable by other users)
4. Proceed to creating the Cluster networks
Create New DAVC Cluster
Cluster Info
Networks
Nodes
Cluster Name
4a462bdf36ae41ce9ffce177f01de7c2
Description
Description
Private
Cancel
Create Networks

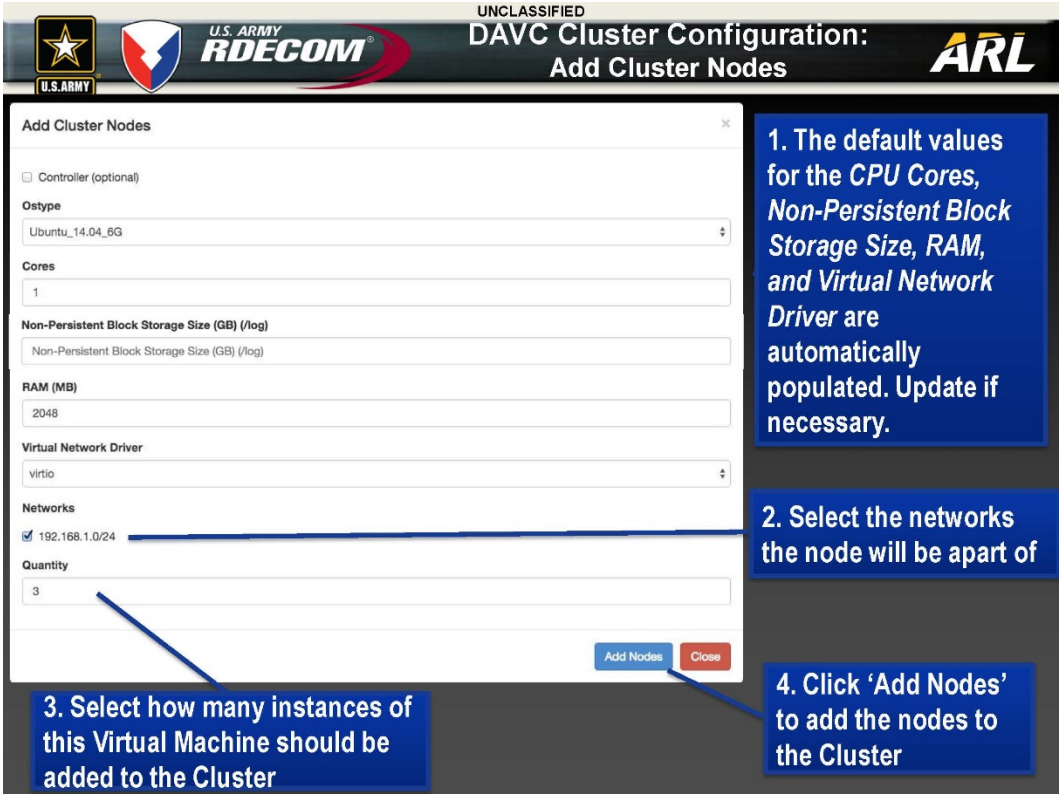

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Networks Tab
ARL
The Networks tab lists all of the networks currently added to the cluster.
1. Click 'Add Cluster Networks' to add a new network
2. Input network in CIDR format
3. Click 'Add Network' to add it to the Cluster
Create New DAVC Cluster
Cluster Info
Networks
Nodes
Add Networks To This Cluster
Add Cluster Networks
Add a Network
Network
192.168.1.0/24
Add Network
Close

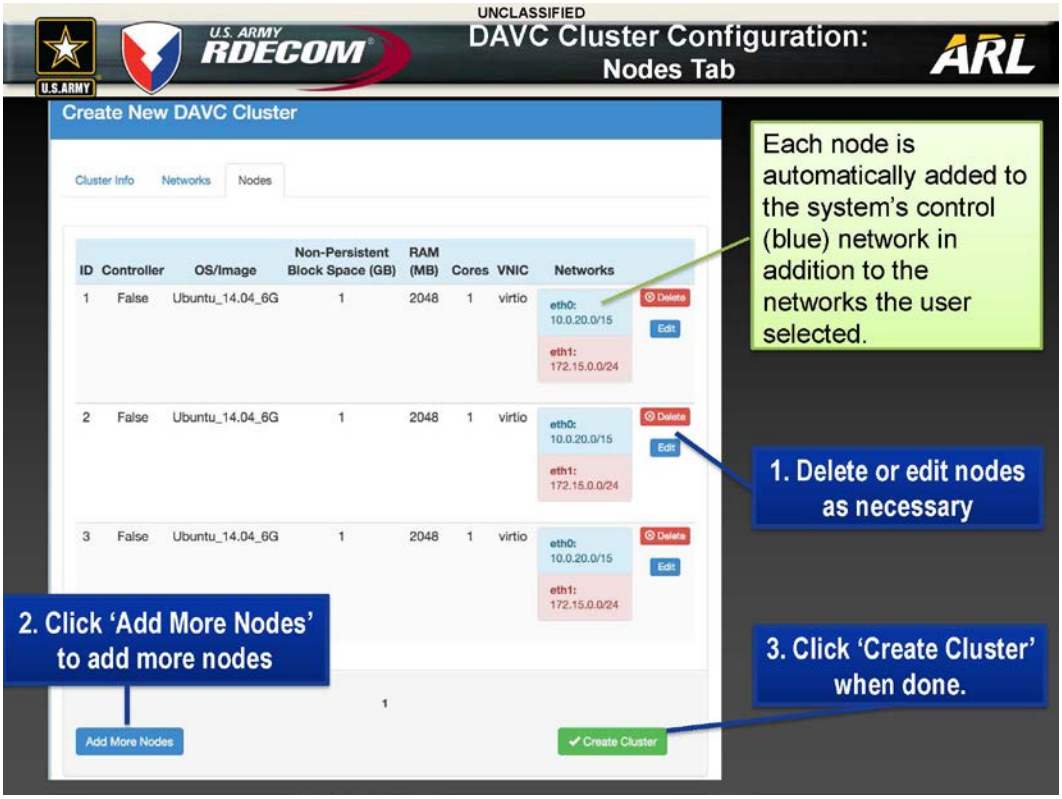

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Networks Tab
ARL
More Networks can be added or deleted from this tab.
Click 'Delete' to remove a network
Create New DAVC Cluster
Cluster Info
Networks
Nodes
ID
Name
Subnet
1
Exp1
192.168.1.0/24
Delete
+ Add More Networks
Add Nodes
Click 'Add More Networks' to add additional networks
Click 'Add Nodes' to begin adding nodes to the Cluster

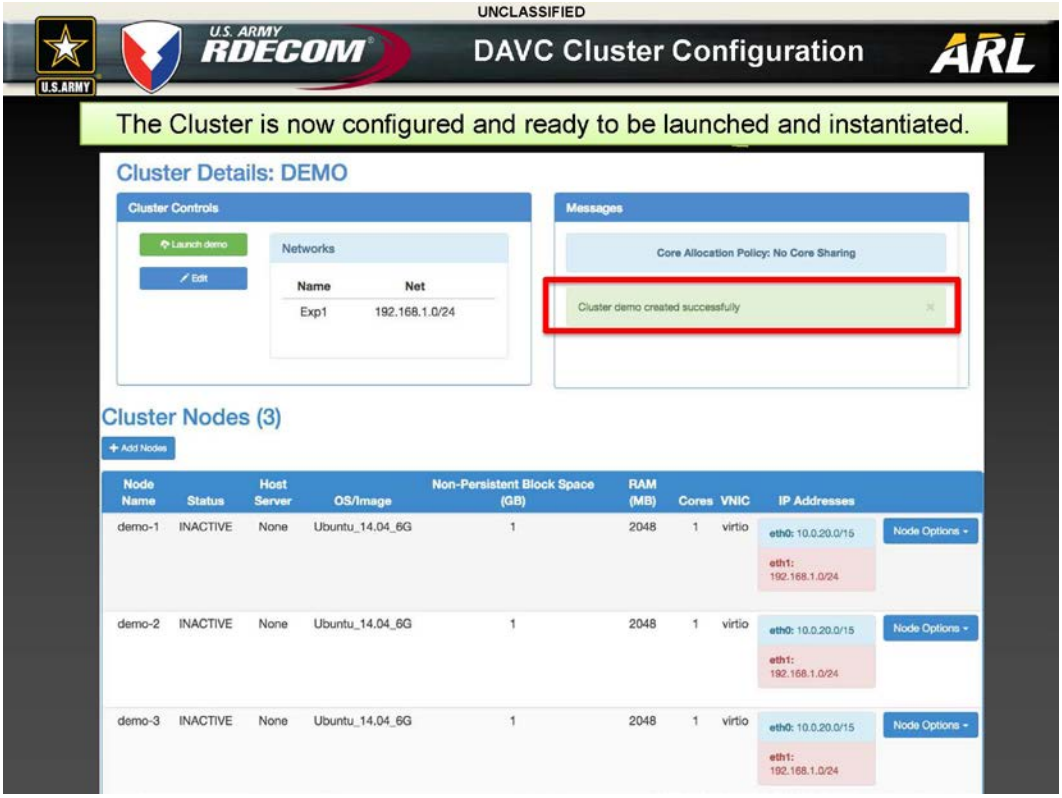

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Nodes Tab
ARL
The Nodes tab lists all of the nodes currently associated with the cluster.
Create New DAVC Cluster
Cluster Info
Networks
Nodes
ID
Controller
OS/Image
Disk Space (GB)
RAM (MB)
Cores
VNIC
Networks
1
Add More Nodes
Create Cluster
Click 'Add More Nodes' to begin adding Nodes


UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Add Cluster Nodes
ARL
The Add Cluster Nodes dialog is used to set the attributes of the nodes that will be added to the cluster.
Add Cluster Nodes
Controller (optional)
Ostype
Cores
1
Non-Persistent Block Storage Size (GB) (/log)
RAM (MB)
Virtual Network Driver
virtio
Networks
Quantity
1
Add Nodes
Close
1. Click the Ostype/Virtual Machine template dropdown box

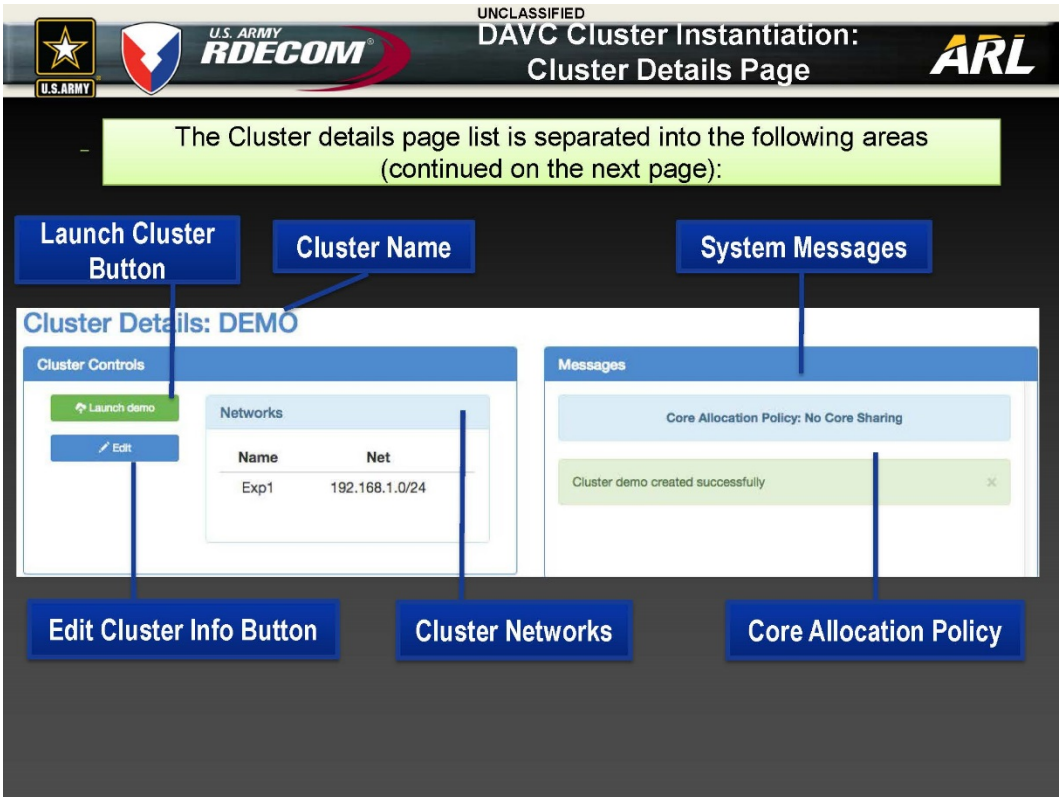

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Add Cluster Nodes
ARL
The Operating System/VM dropdown lists all of the public Virtual Machines loaded into DAVC
Add Cluster Nodes
Controller (optional)
Ostype
Algolink_Satellite
Exp_Framework_Base
A3E_node
Android_x86
Ubuntu_14.04_6G
glusterfs_node
Route_Planning_Agent
Source_Selection
Algolink_Master_v2
AlgoLink_EF
EMANE_9.2_16G
EMANE_9.2_20G
EMANE_9.2_6G
CentOS-7_x86_64_base
ubuntu-14_04_25G
ubuntu-14_04_15G
Android_x86_MediaScope
IOT_Compression
Tomography
XCN_Framework
XCN_EF
D3JS_IP_Data_Server
Elicit_pre-installed_v2
IBM_Exp_Facility_v2
Elicit_pre_installed_OLSR
Fusion_2016
Select a Virtual Machine

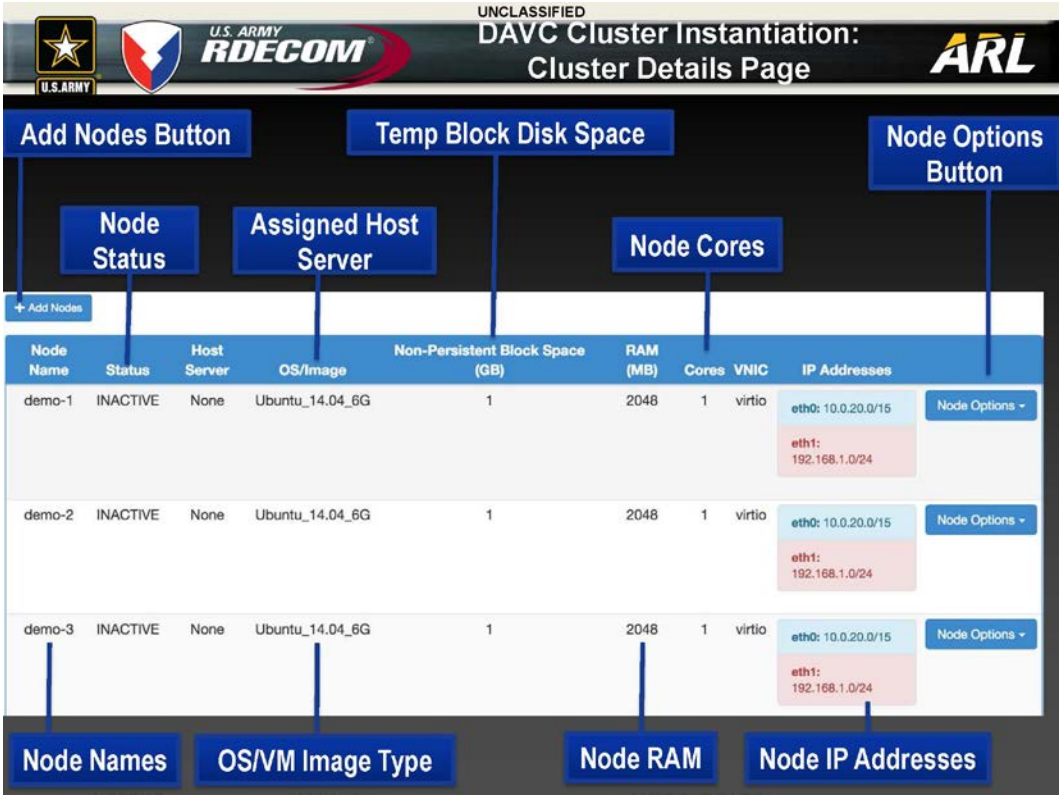

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Add Cluster Nodes
ARL
Add Cluster Nodes
Controller (optional)
Ostype
Ubuntu_14.04_6G
Cores
1
Non-Persistent Block Storage Size (GB) (/log)
Non-Persistent Block Storage Size (GB) (/log)
RAM (MB)
2048
Virtual Network Driver
virtio
Networks
192.168.1.0/24
Quantity
3
Add Nodes
Close
1. The default values for the CPU Cores, Non-Persistent Block Storage Size, RAM, and Virtual Network Driver are automatically populated. Update if necessary.
2. Select the networks the node will be apart of
3. Select how many instances of this Virtual Machine should be added to the Cluster
4. Click 'Add Nodes' to add the nodes to the Cluster

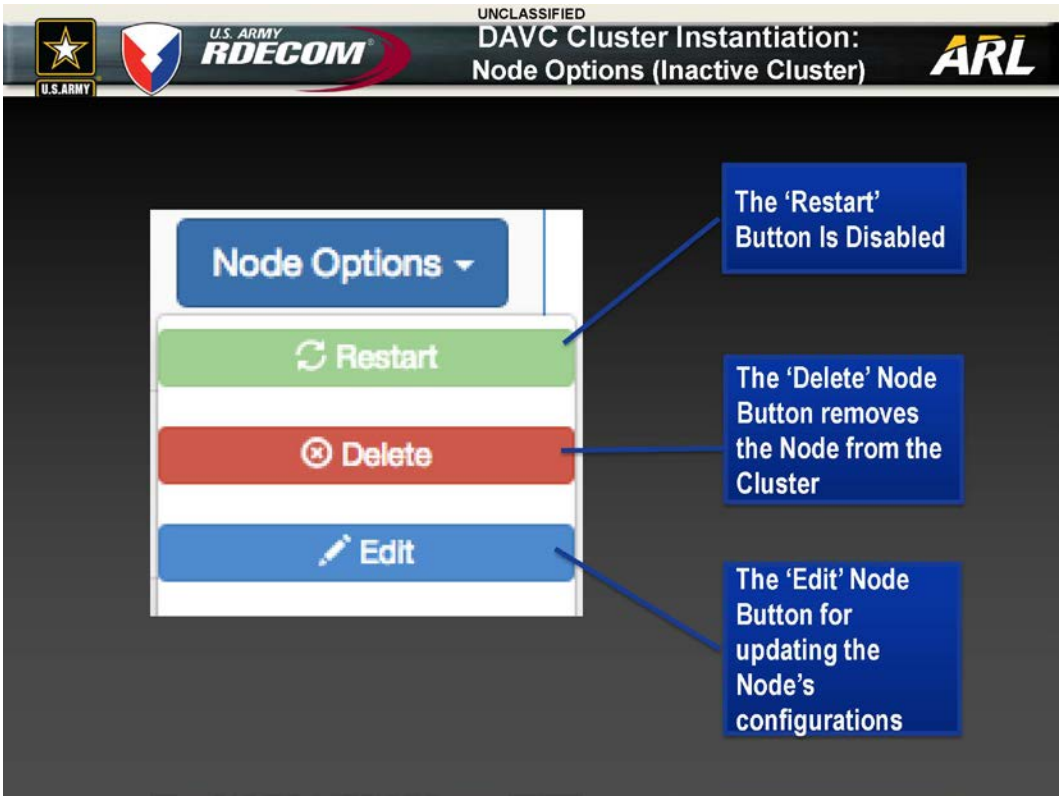

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Configuration:
Nodes Tab
ARL
Create New DAVC Cluster
Cluster Info
Networks
Nodes
ID Controller OS/Image Non-Persistent Block Space (GB) RAM (MB) Cores VNIC Networks
1 False Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1: 172.15.0.0/24 Delete Edit
2 False Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1: 172.15.0.0/24 Delete Edit
3 False Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1: 172.15.0.0/24 Delete Edit
Add More Nodes
Create Cluster
Each node is automatically added to the system's control (blue) network in addition to the networks the user selected.
1. Delete or edit nodes as necessary
2. Click 'Add More Nodes' to add more nodes
3. Click 'Create Cluster' when done.

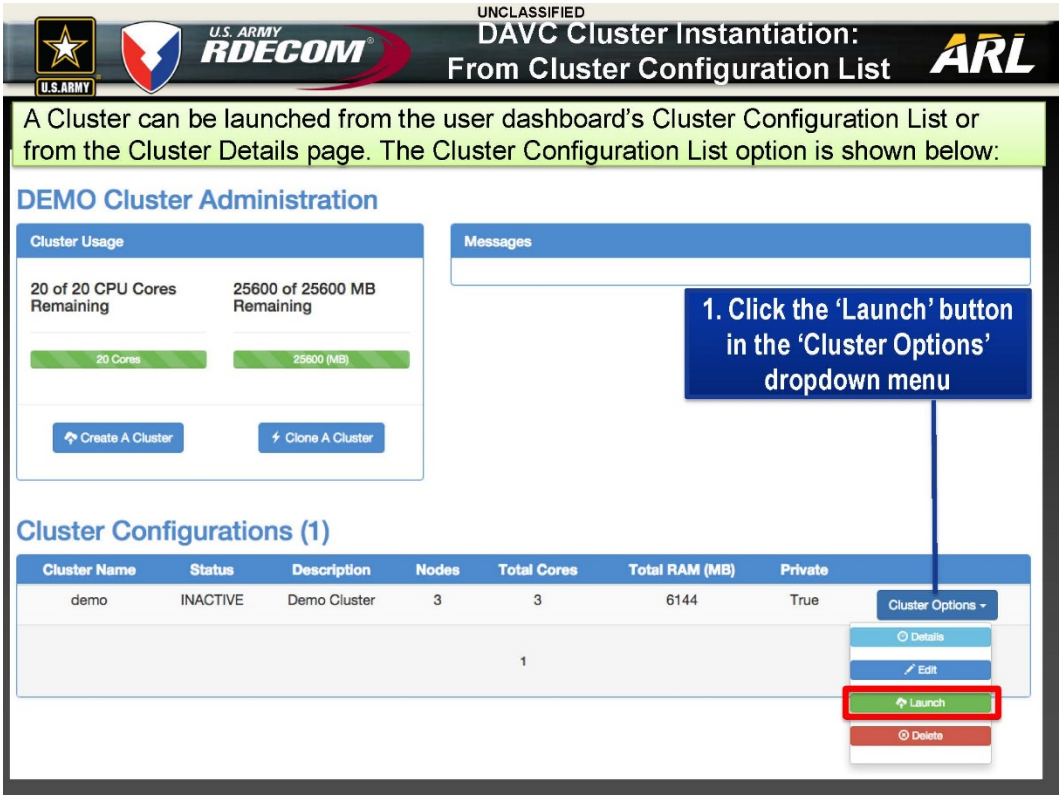


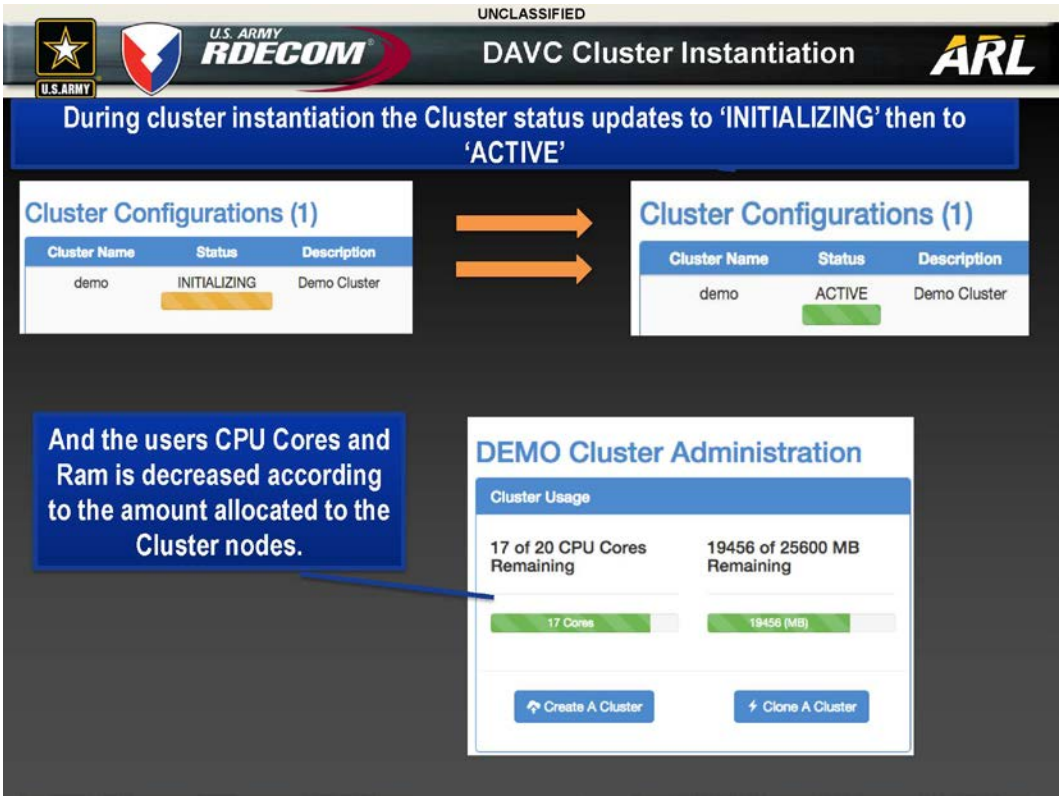
4. DAVC Cluster Instantiation

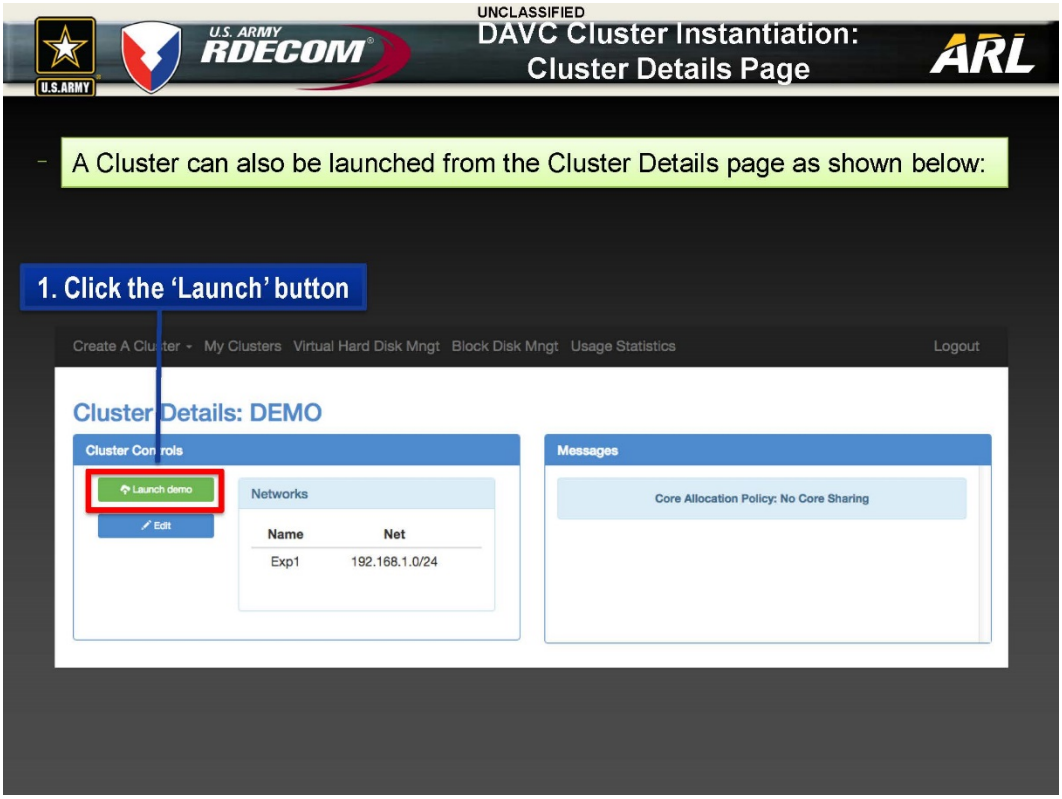


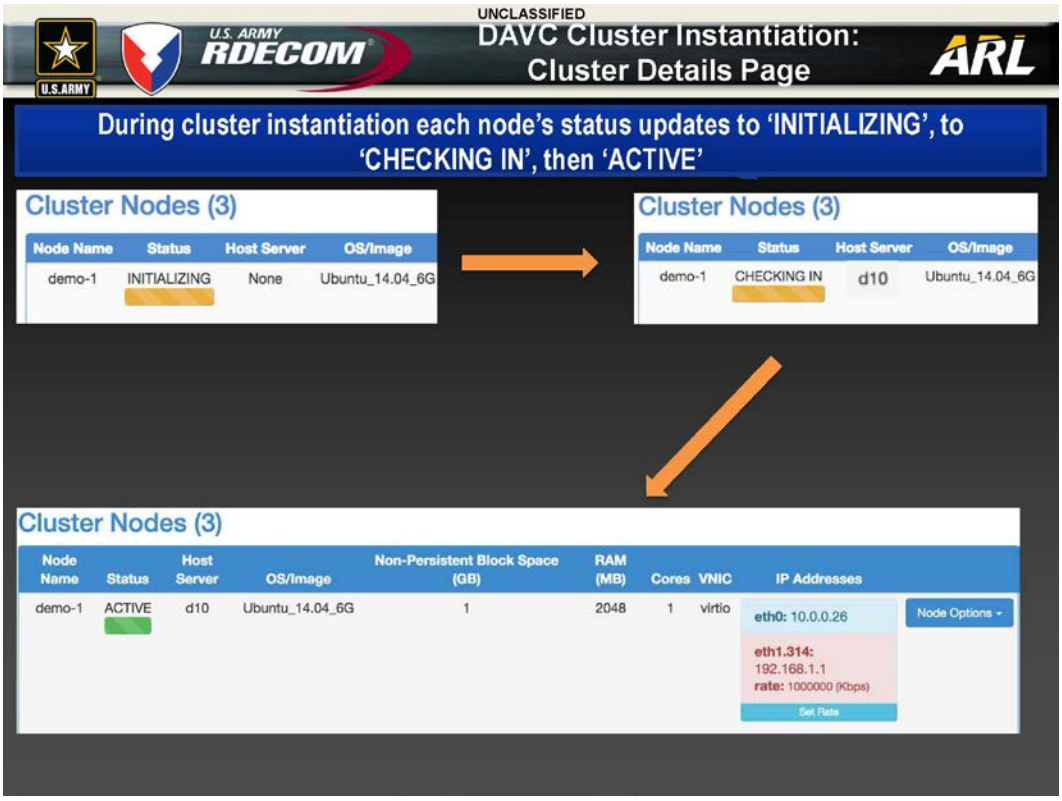

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Instantiation:
Cluster Details Page
ARL
Add Nodes Button
Temp Block Disk Space
Node Options Button
Node Status
Assigned Host Server
Node Cores
+ Add Nodes
Node Name
Status
Host Server
OS/Image
Non-Persistent Block Space (GB)
RAM (MB)
Cores
VNIC
IP Addresses
demo-1 INACTIVE None Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1: 192.168.1.0/24 Node Options
demo-2 INACTIVE None Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1: 192.168.1.0/24 Node Options
demo-3 INACTIVE None Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1: 192.168.1.0/24 Node Options
Node Names
OS/VM Image Type
Node RAM
Node IP Addresses

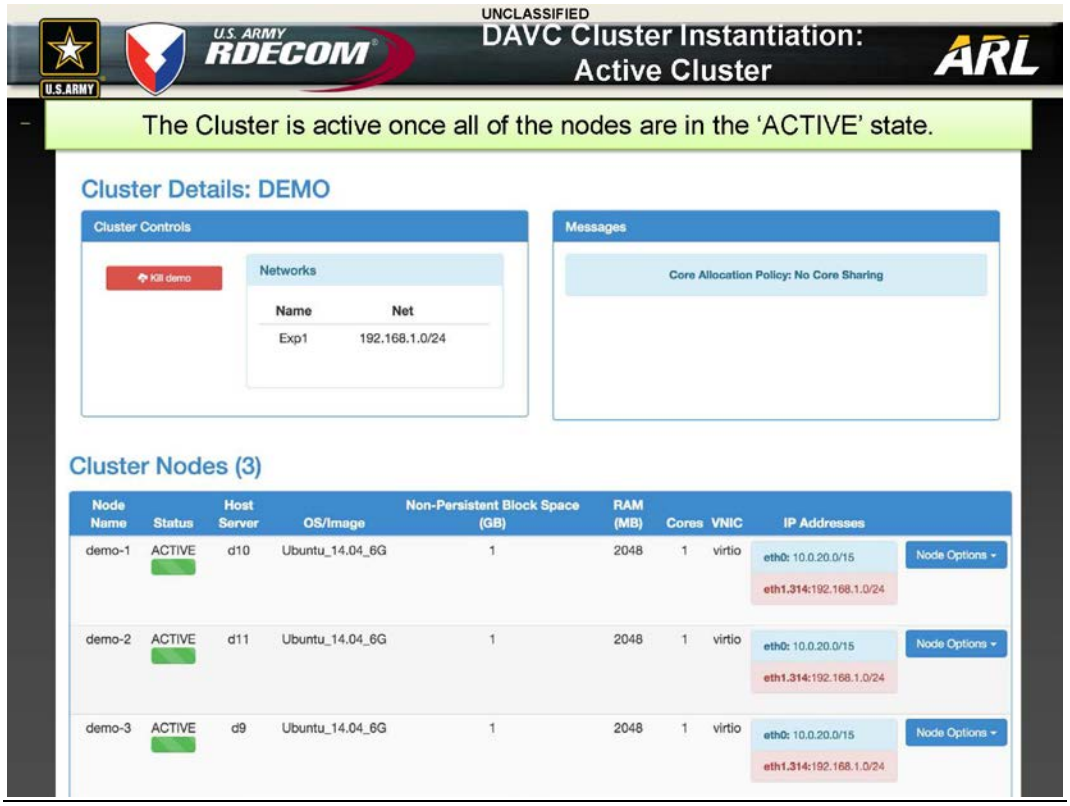

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Instantiation:
Node Options (Inactive Cluster)
ARL
Node Options
Restart
Delete
Edit
The 'Restart' Button Is Disabled
The 'Delete' Node Button removes the Node from the Cluster
The 'Edit' Node Button for updating the Node's configurations


UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Instantiation:
From Cluster Configuration List
ARL
A Cluster can be launched from the user dashboard's Cluster Configuration List or from the Cluster Details page. The Cluster Configuration List option is shown below:
DEMO Cluster Administration
Cluster Usage
20 of 20 CPU Cores Remaining
25600 of 25600 MB Remaining
20 Cores
25600 (MB)
Create A Cluster
Clone A Cluster
Messages
1. Click the 'Launch' button in the 'Cluster Options' dropdown menu
Cluster Configurations (1)
Cluster Name
Status
Description
Nodes
Total Cores
Total RAM (MB)
Private
demo
INACTIVE
Demo Cluster
3
3
6144
True
Cluster Options
Details
Edit
Launch
Delete
1

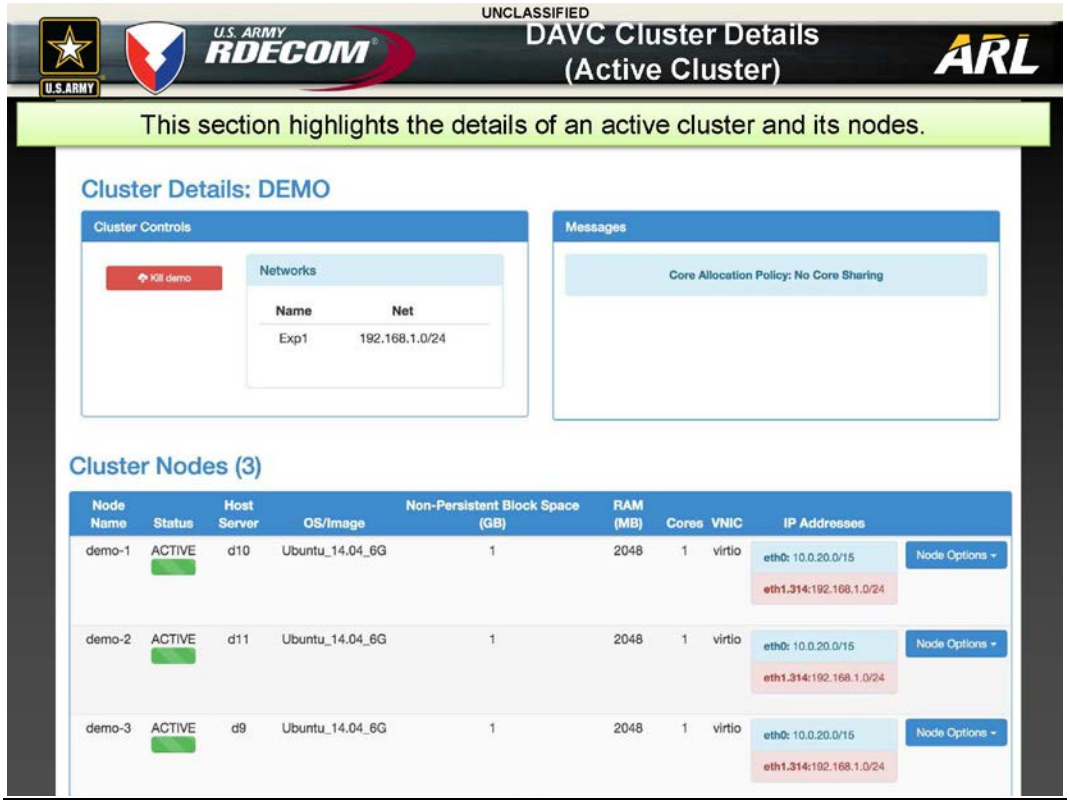

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Instantiation
ARL
During cluster instantiation the Cluster status updates to 'INITIALIZING' then to 'ACTIVE'
Cluster Configurations (1)
Cluster Name
Status
Description
demo
INITIALIZING
Demo Cluster
Cluster Configurations (1)
Cluster Name
Status
Description
demo
ACTIVE
Demo Cluster
And the users CPU Cores and Ram is decreased according to the amount allocated to the Cluster nodes.
DEMO Cluster Administration
Cluster Usage
17 of 20 CPU Cores Remaining
19456 of 25600 MB Remaining
17 Cores
19456 (MB)
Create A Cluster
Clone A Cluster

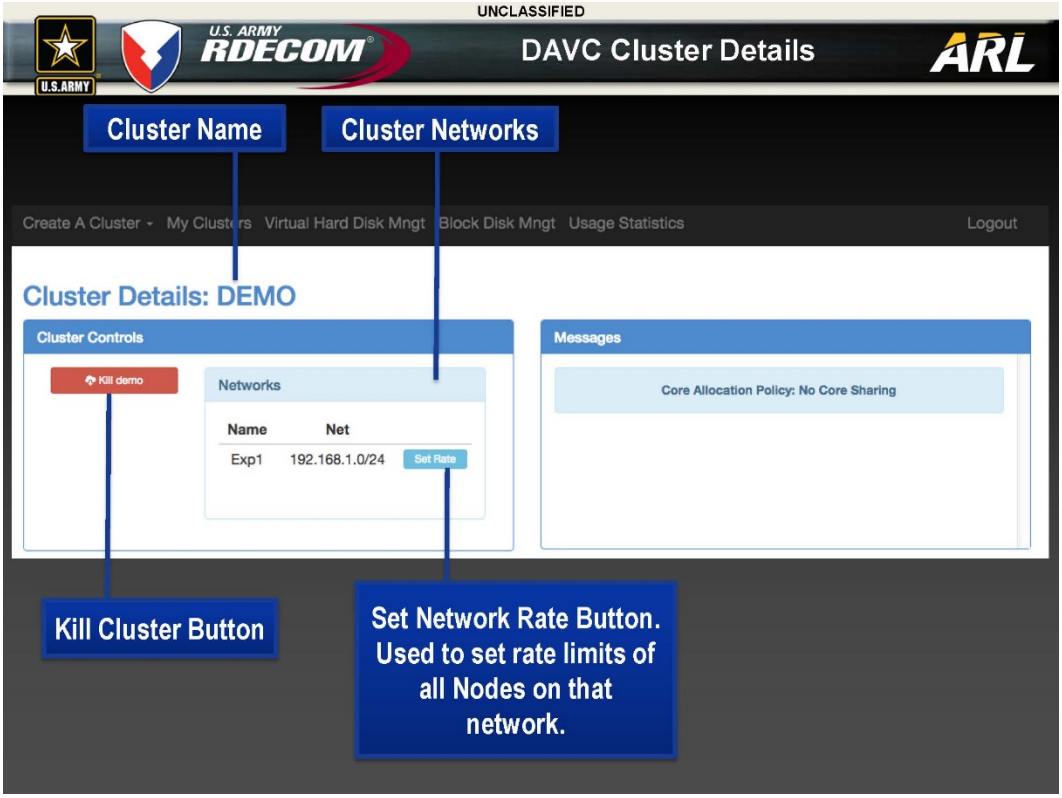

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Instantiation:
Cluster Details Page
ARL
A Cluster can also be launched from the Cluster Details page as shown below:
1. Click the 'Launch' button
Create A Cluster
My Clusters
Virtual Hard Disk Mngt
Block Disk Mngt
Usage Statistics
Logout
Cluster Details: DEMO
Cluster Controls
Launch demo
Edit
Networks
Name
Net
Exp1
192.168.1.0/24
Messages
Core Allocation Policy: No Core Sharing

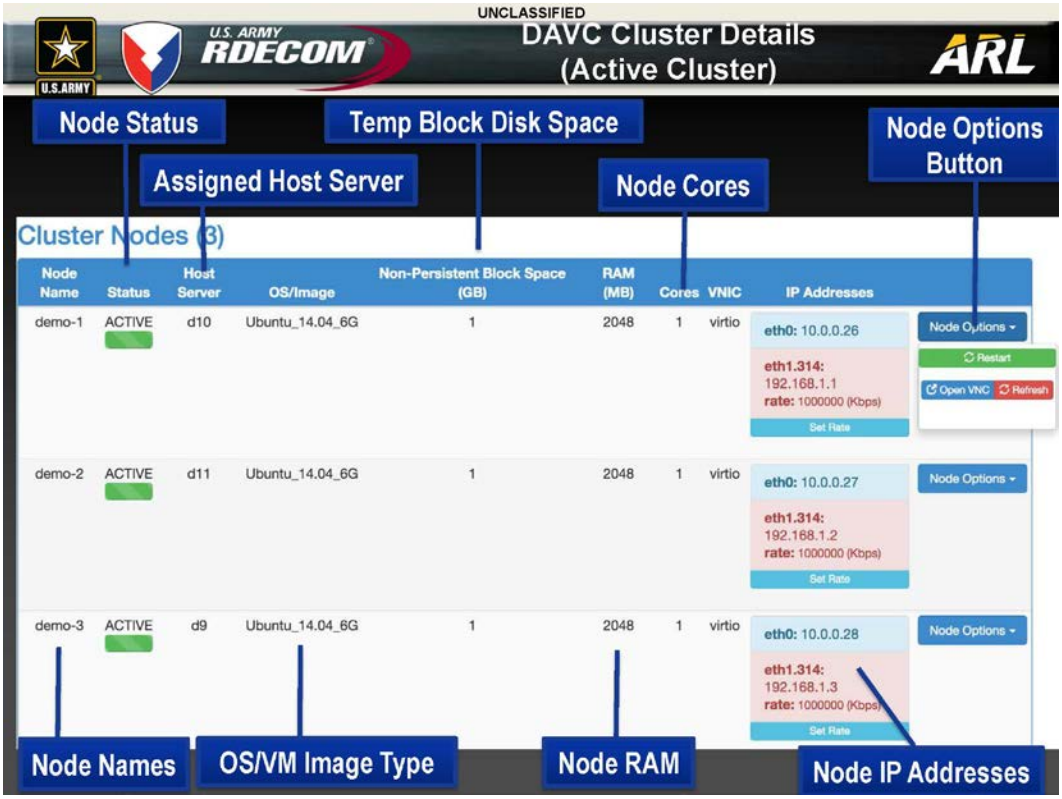

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Instantiation:
Cluster Details Page
ARL
During cluster instantiation each node's status updates to 'INITIALIZING', to 'CHECKING IN', then 'ACTIVE'
Cluster Nodes (3)
Node Name
Status
Host Server
OS/Image
demo-1
INITIALIZING
None
Ubuntu_14.04_6G
Cluster Nodes (3)
Node Name
Status
Host Server
OS/Image
demo-1
CHECKING IN
d10
Ubuntu_14.04_6G
Cluster Nodes (3)
Node Name
Status
Host Server
OS/Image
Non-Persistent Block Space (GB)
RAM (MB)
Cores
VNIC
IP Addresses
demo-1
ACTIVE
d10
Ubuntu_14.04_6G
1
2048
1
virtio
eth0: 10.0.0.26
Node Options
eth1.314:
192.168.1.1
rate: 1000000 (Kbps)
Set Rate

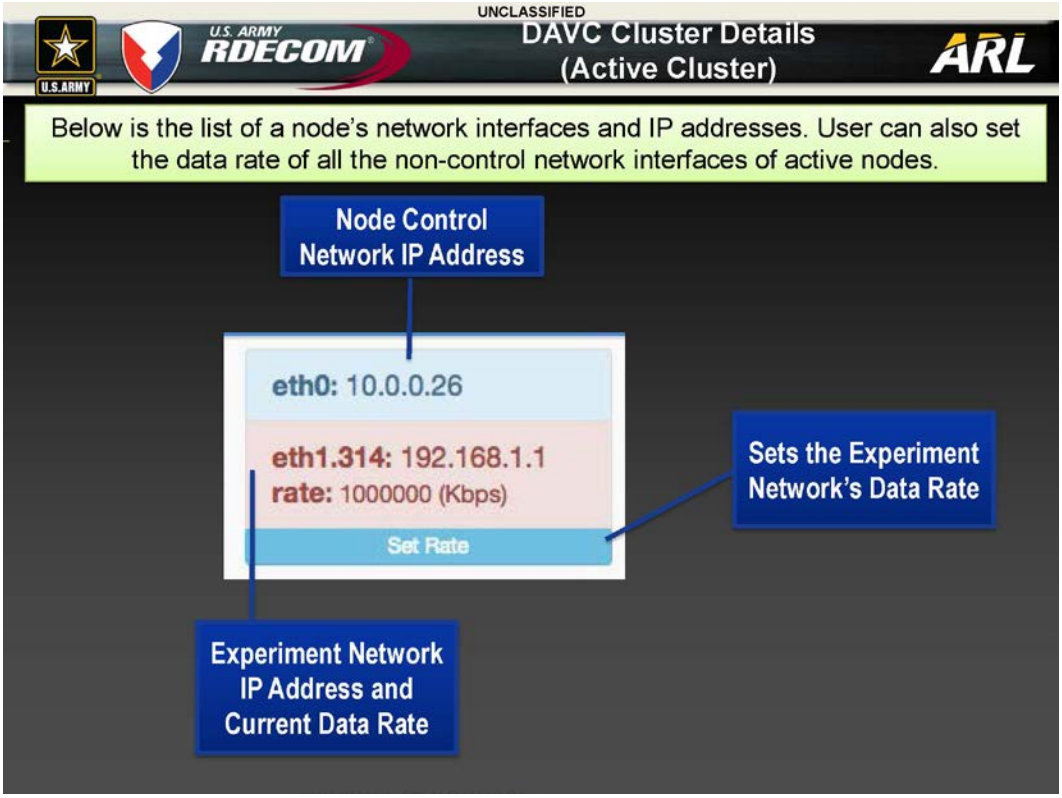

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Instantiation: Active Cluster
ARL
The Cluster is active once all of the nodes are in the 'ACTIVE' state.
Cluster Details: DEMO
Cluster Controls
Kill demo
Networks
Name Net
Exp1 192.168.1.0/24
Messages
Core Allocation Policy: No Core Sharing
Cluster Nodes (3)
Node Name Status Host Server OS/Image Non-Persistent Block Space (GB) RAM (MB) Cores VNIC IP Addresses
demo-1 ACTIVE d10 Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1.314:192.168.1.0/24 Node Options
demo-2 ACTIVE d11 Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1.314:192.168.1.0/24 Node Options
demo-3 ACTIVE d9 Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.20.0/15 eth1.314:192.168.1.0/24 Node Options

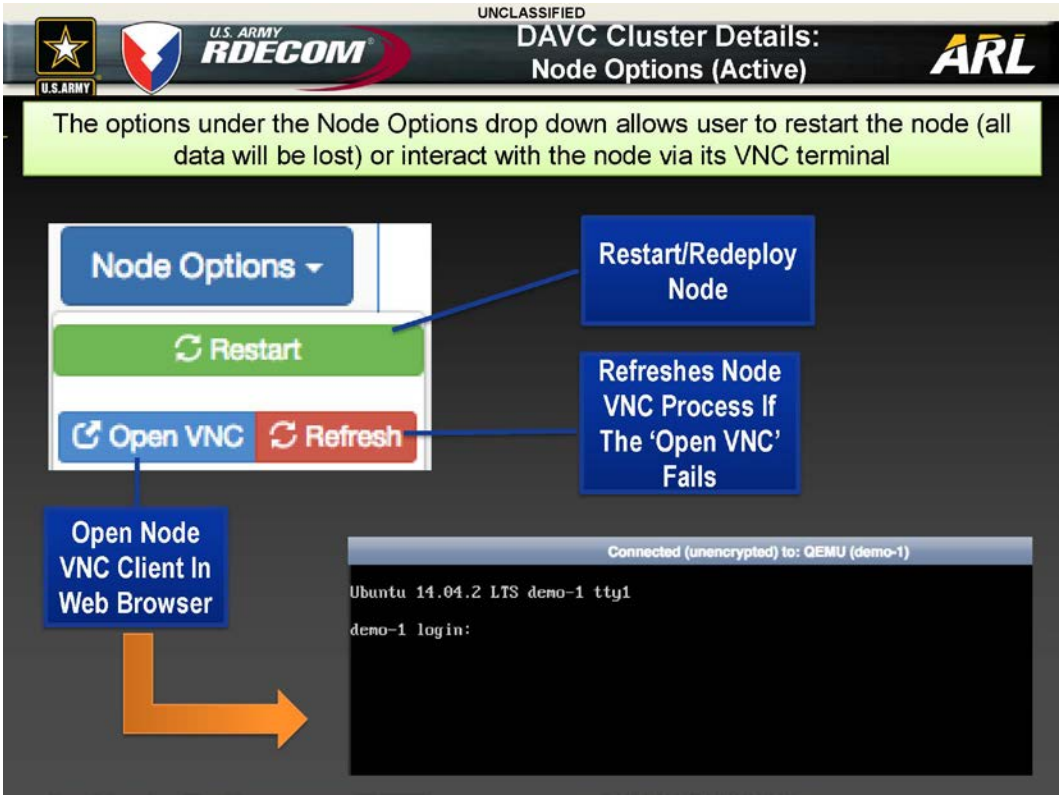
5. DAVC Cluster and Node Details



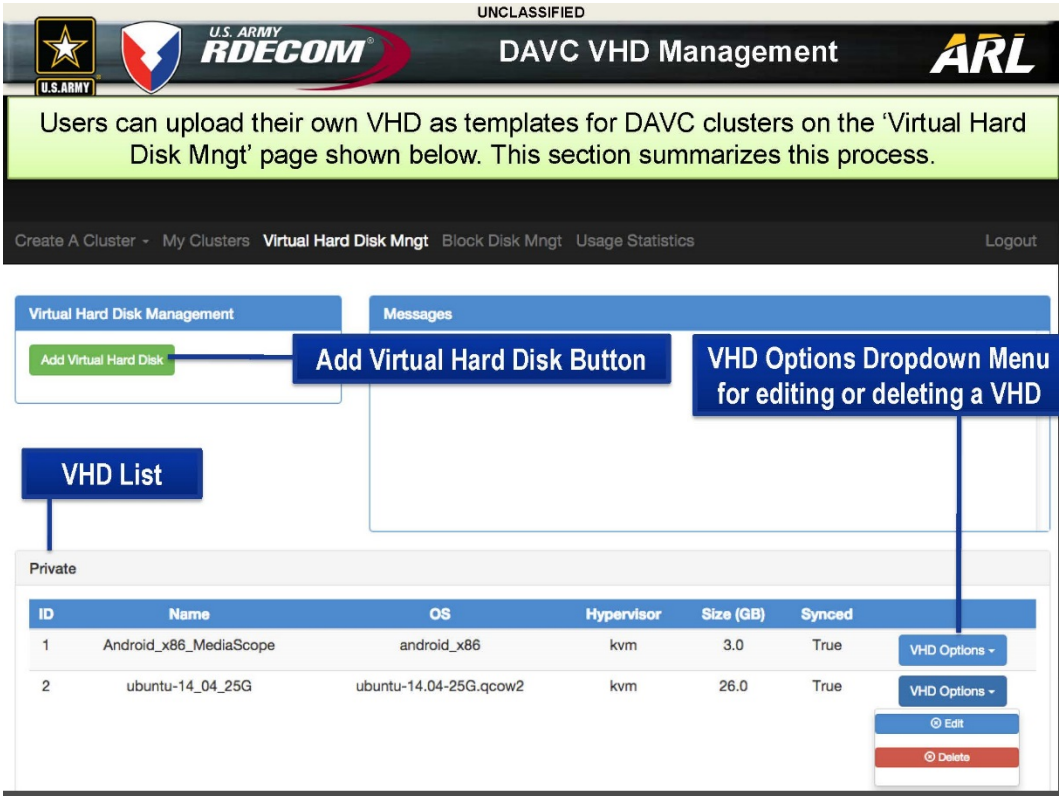

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Details
ARL
Cluster Name
Cluster Networks
Create A Cluster
My Clusters
Virtual Hard Disk Mngt
Block Disk Mngt
Usage Statistics
Logout
Cluster Details: DEMO
Cluster Controls
Kill demo
Networks
Name
Net
Exp1
192.168.1.0/24
Set Rate
Messages
Core Allocation Policy: No Core Sharing
Kill Cluster Button
Set Network Rate Button. Used to set rate limits of all Nodes on that network.

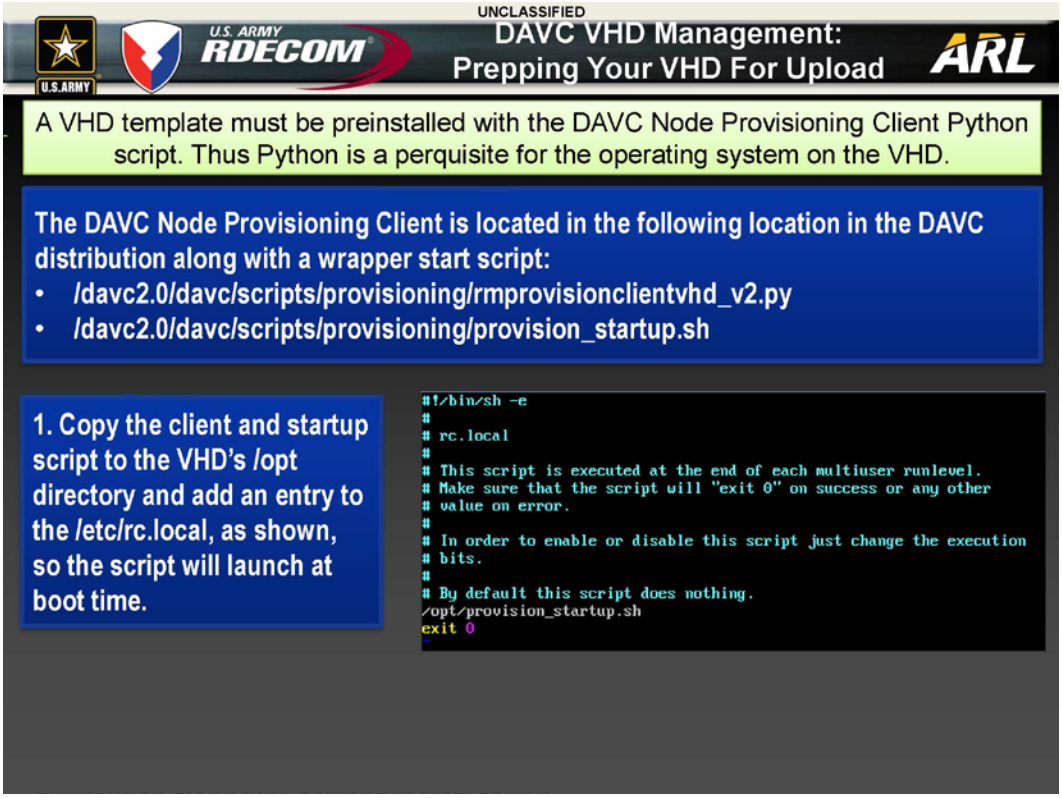

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Details (Active Cluster)
ARL
Node Status
Temp Block Disk Space
Node Options Button
Assigned Host Server
Node Cores
Cluster Nodes (3)
Node Name
Status
Host Server
OS/Image
Non-Persistent Block Space (GB)
RAM (MB)
Cores
VNIC
IP Addresses
demo-1
ACTIVE
d10
Ubuntu_14.04_6G
1
2048
1
virtio
eth0: 10.0.0.26
eth1.314:
192.168.1.1
rate: 1000000 (Kbps)
Set Rate
Node Options
Restart
Open VNC
Refresh
demo-2
ACTIVE
d11
Ubuntu_14.04_6G
1
2048
1
virtio
eth0: 10.0.0.27
eth1.314:
192.168.1.2
rate: 1000000 (Kbps)
Set Rate
Node Options
demo-3
ACTIVE
d9
Ubuntu_14.04_6G
1
2048
1
virtio
eth0: 10.0.0.28
eth1.314:
192.168.1.3
rate: 1000000 (Kbps)
Set Rate
Node Options
Node Names
OS/VM Image Type
Node RAM
Node IP Addresses

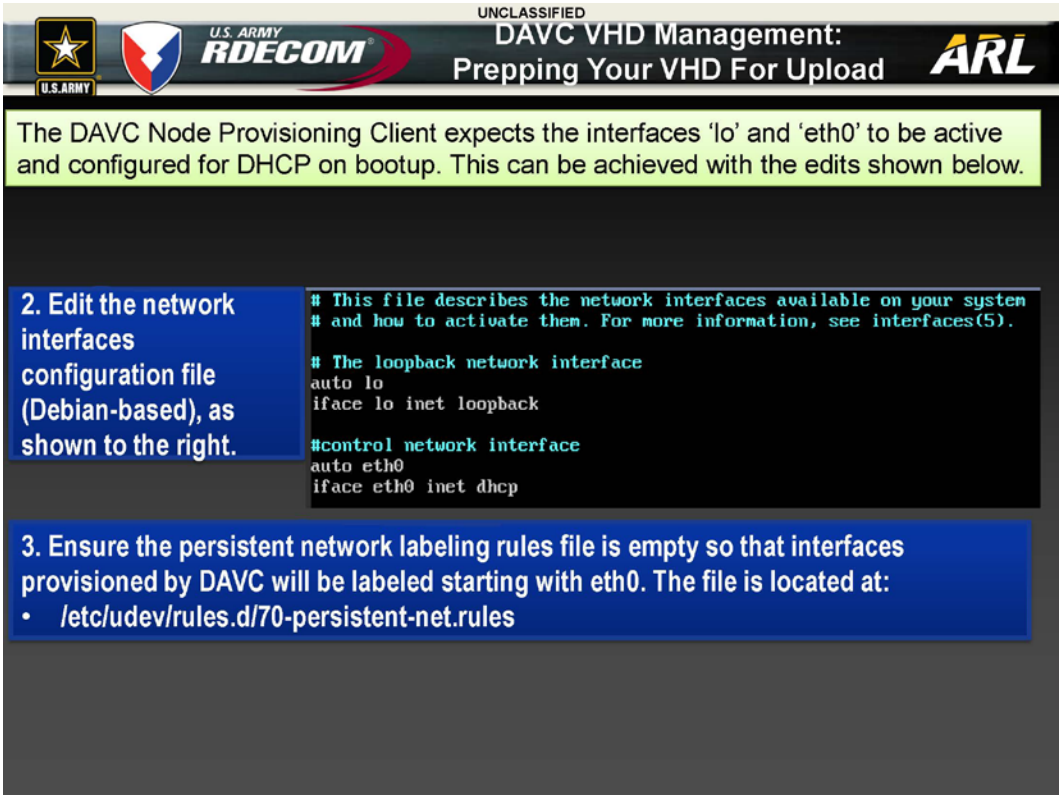

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Details (Active Cluster)
ARL
Below is the list of a node's network interfaces and IP addresses. User can also set the data rate of all the non-control network interfaces of active nodes.
Node Control Network IP Address
eth0: 10.0.0.26
eth1.314: 192.168.1.1
rate: 1000000 (Kbps)
Set Rate
Sets the Experiment Network's Data Rate
Experiment Network IP Address and Current Data Rate

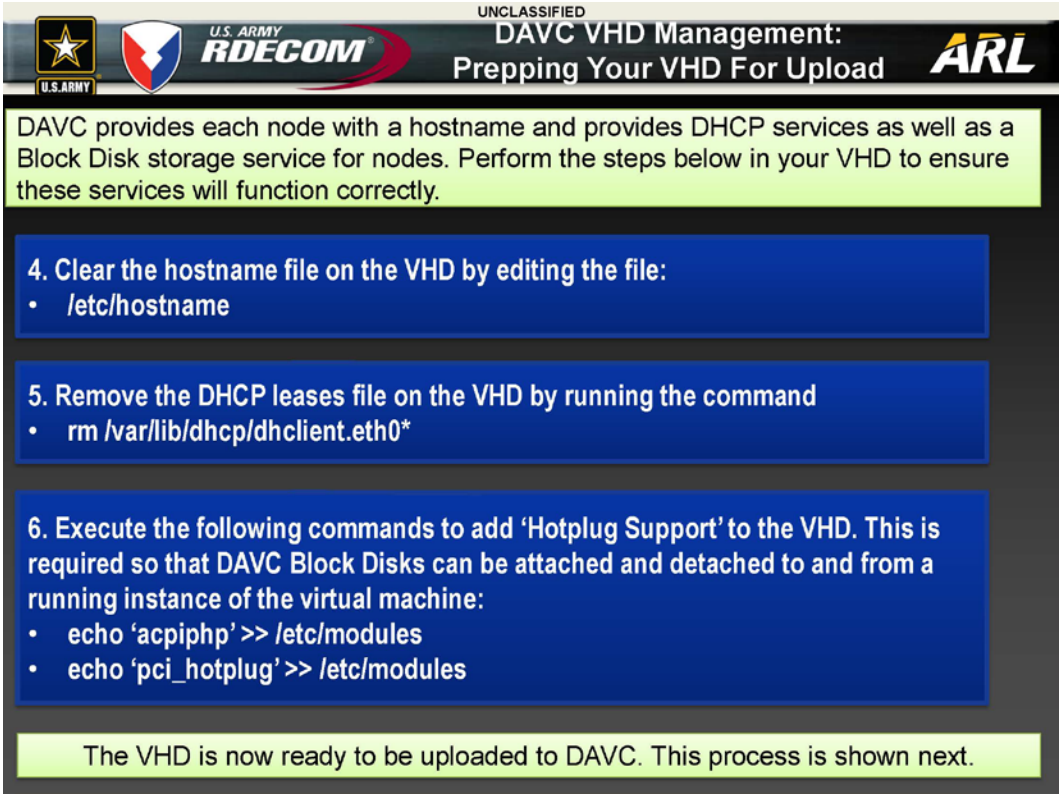

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Cluster Details: Node Options (Active)
ARL
The options under the Node Options drop down allows user to restart the node (all data will be lost) or interact with the node via its VNC terminal
Node Options
Restart
Open VNC
Refresh
Restart/Redeploy Node
Refreshes Node VNC Process If The 'Open VNC' Fails
Open Node VNC Client In Web Browser
Connected (unencrypted) to: QEMU (demo-1)
Ubuntu 14.04.2 LTS demo-1 tty1
demo-1 login:

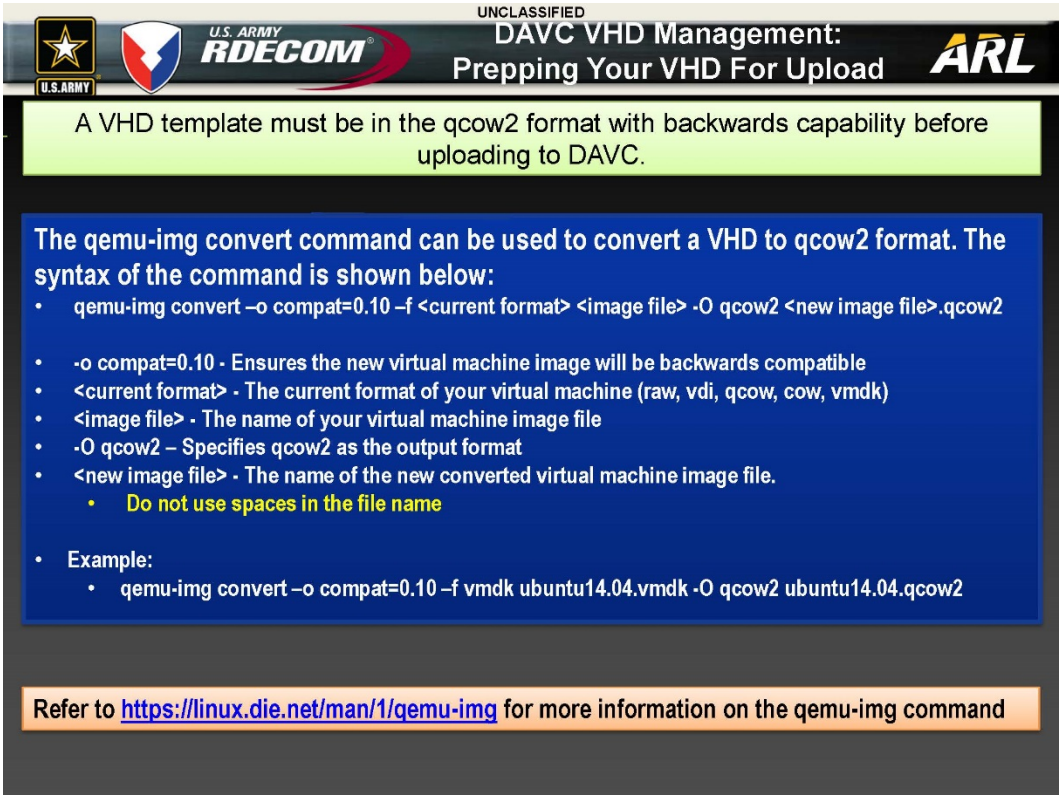
6. DAVC Virtual Hard Disk Management

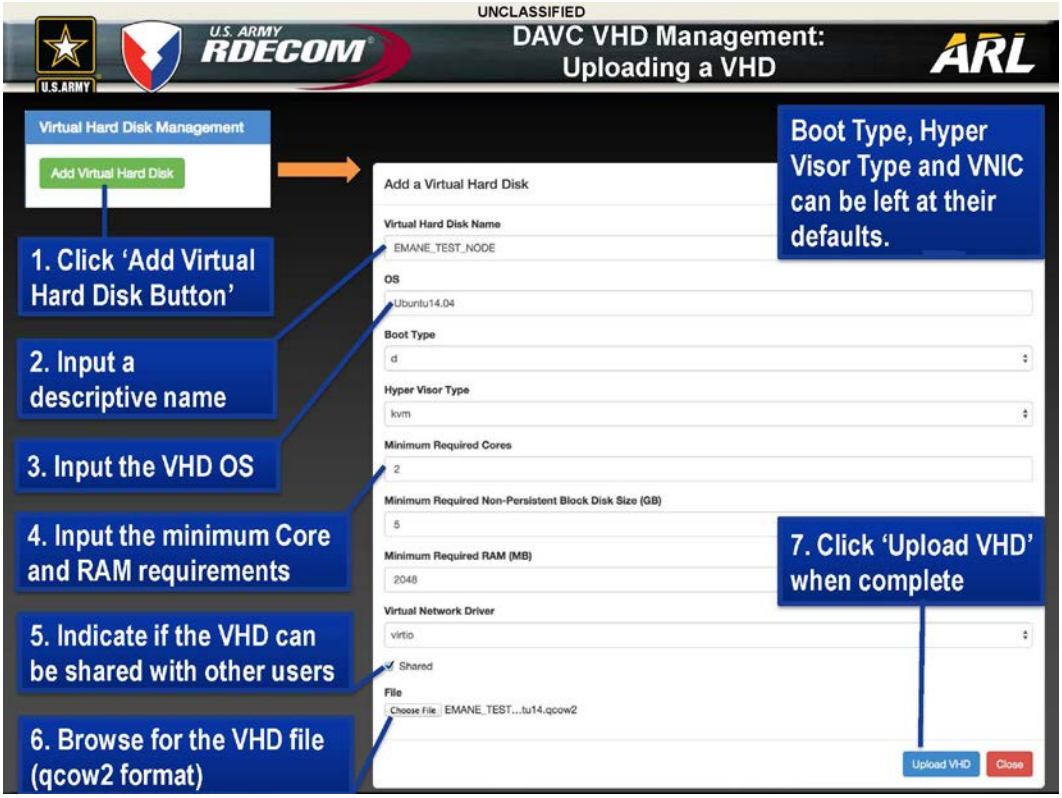


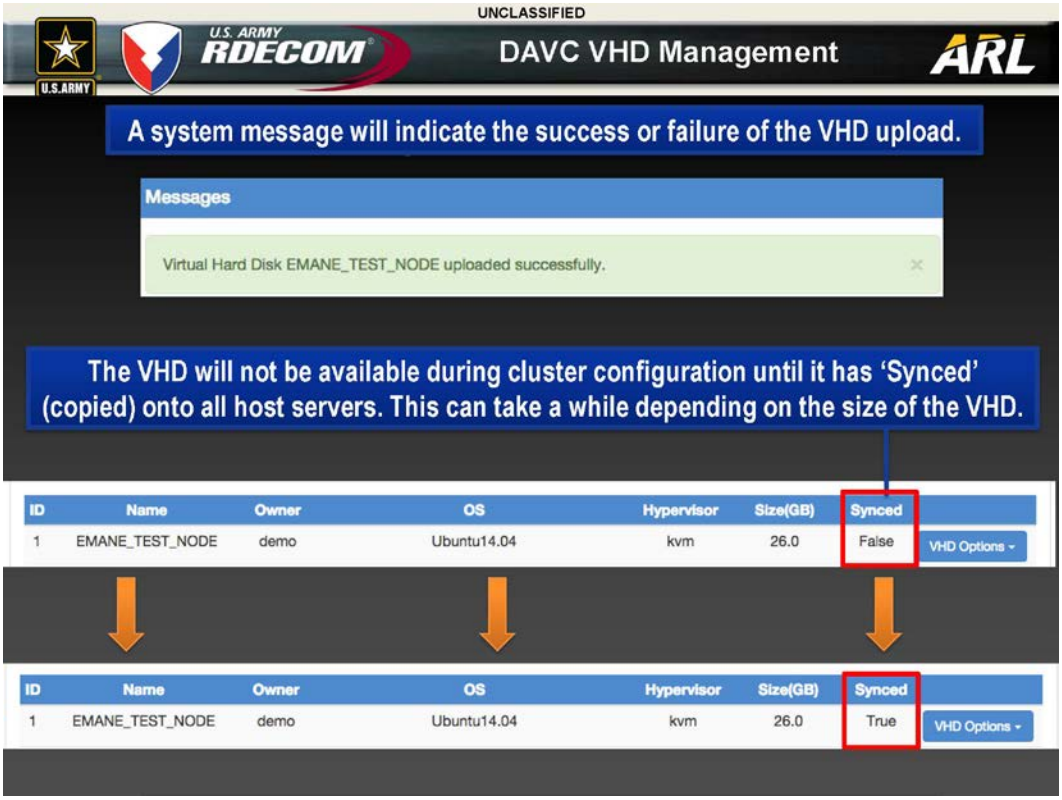

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC VHD Management:
Prepping Your VHD For Upload
ARL
A VHD template must be preinstalled with the DAVC Node Provisioning Client Python script. Thus Python is a perquisite for the operating system on the VHD.
The DAVC Node Provisioning Client is located in the following location in the DAVC distribution along with a wrapper start script:
• /davc2.0/davc/scripts/provisioning/rmprovisionclientvhd_v2.py
• /davc2.0/davc/scripts/provisioning/provision_startup.sh
1. Copy the client and startup script to the VHD's /opt directory and add an entry to the /etc/rc.local, as shown, so the script will launch at boot time.
#!/bin/sh -e
#
rc.local
#
This script is executed at the end of each multiuser runlevel.
Make sure that the script will "exit 0" on success or any other
value on error.
#
In order to enable or disable this script just change the execution
bits.
#
By default this script does nothing.
/opt/provision_startup.sh
exit 0


UNCLASSIFIED
U.S. ARMY RDECOM
DAVC VHD Management:
Prepping Your VHD For Upload
ARL
The DAVC Node Provisioning Client expects the interfaces 'lo' and 'eth0' to be active and configured for DHCP on bootup. This can be achieved with the edits shown below.
2. Edit the network interfaces configuration file (Debian-based), as shown to the right.
This file describes the network interfaces available on your system
and how to activate them. For more information, see interfaces(5).
The loopback network interface
auto lo
iface lo inet loopback
#control network interface
auto eth0
iface eth0 inet dhcp
3. Ensure the persistent network labeling rules file is empty so that interfaces provisioned by DAVC will be labeled starting with eth0. The file is located at:
• /etc/udev/rules.d/70-persistent-net.rules

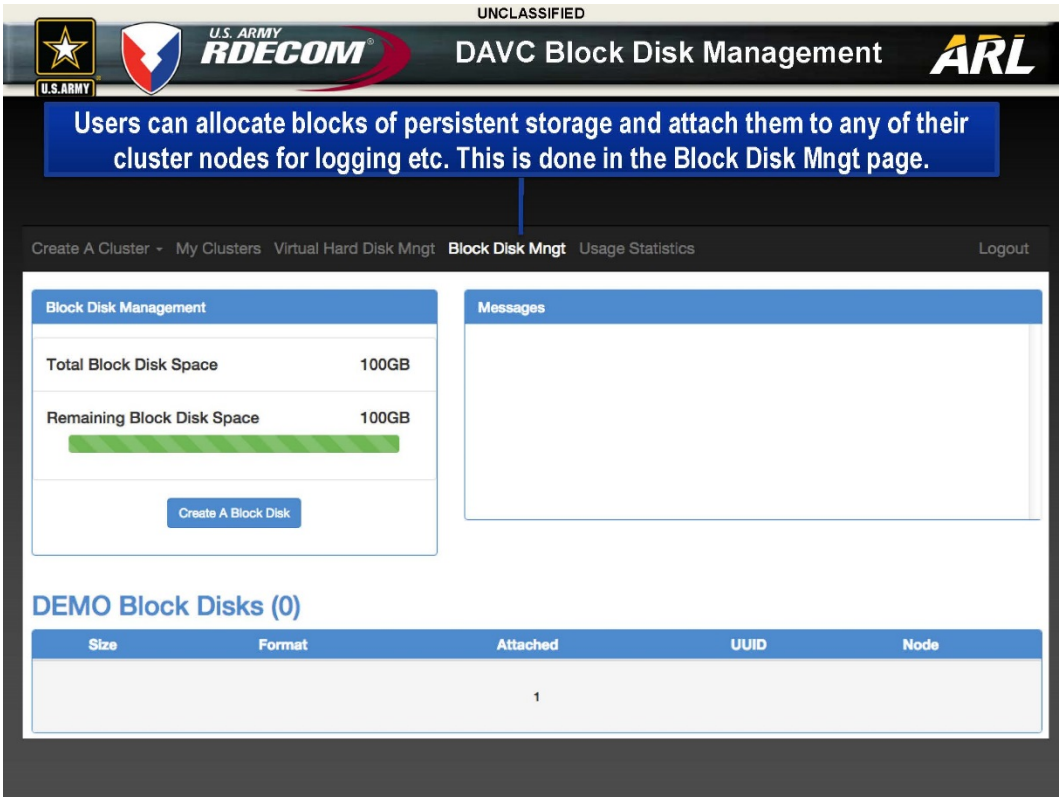

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC VHD Management:
Prepping Your VHD For Upload
ARL
DAVC provides each node with a hostname and provides DHCP services as well as a Block Disk storage service for nodes. Perform the steps below in your VHD to ensure these services will function correctly.
4. Clear the hostname file on the VHD by editing the file:
• /etc/hostname
5. Remove the DHCP leases file on the VHD by running the command
• rm /var/lib/dhcp/dhclient.eth0*
6. Execute the following commands to add 'Hotplug Support' to the VHD. This is required so that DAVC Block Disks can be attached and detached to and from a running instance of the virtual machine:
• echo 'acpiphp' >> /etc/modules
• echo 'pci_hotplug' >> /etc/modules
The VHD is now ready to be uploaded to DAVC. This process is shown next.

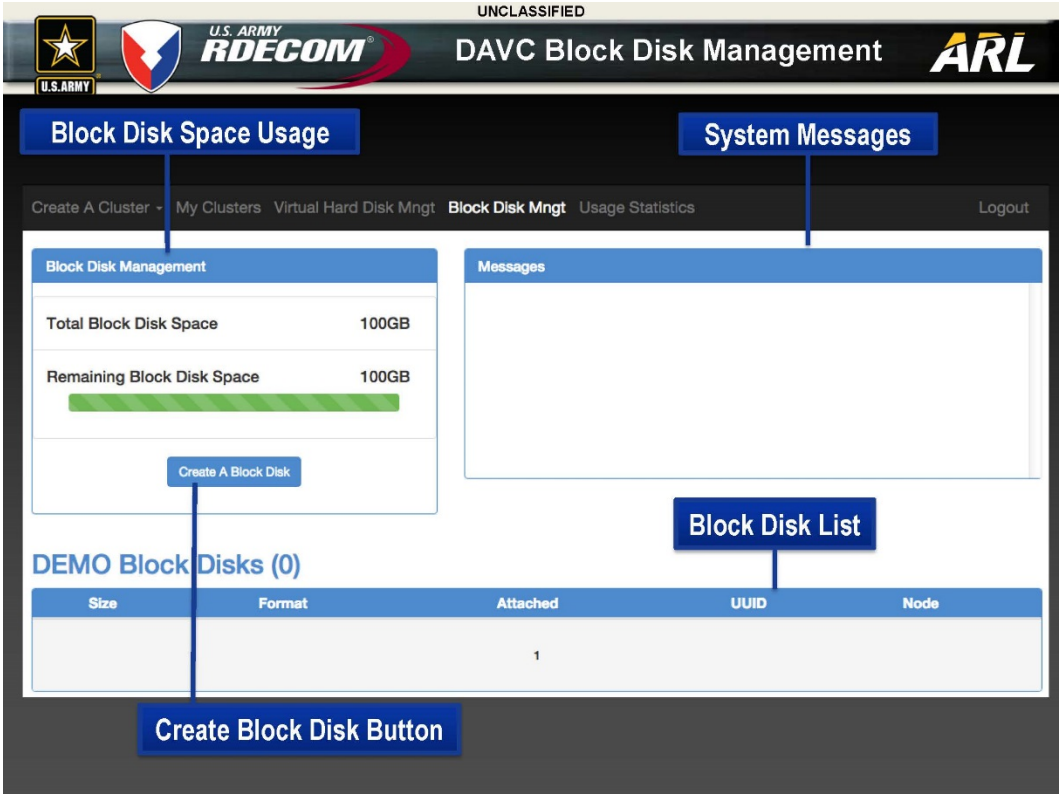

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC VHD Management:
Prepping Your VHD For Upload
ARL
A VHD template must be in the qcow2 format with backwards capability before uploading to DAVC.
The qemu-img convert command can be used to convert a VHD to qcow2 format. The syntax of the command is shown below:
• qemu-img convert –o compat=0.10 –f <current format> <image file> -O qcow2 <new image file>.qcow2
• -o compat=0.10 - Ensures the new virtual machine image will be backwards compatible
• <current format> - The current format of your virtual machine (raw, vdi, qcow, cow, vmdk)
• <image file> - The name of your virtual machine image file
• -O qcow2 – Specifies qcow2 as the output format
• <new image file> - The name of the new converted virtual machine image file.
• Do not use spaces in the file name
• Example:
• qemu-img convert –o compat=0.10 –f vmdk ubuntu14.04.vmdk -O qcow2 ubuntu14.04.qcow2
Refer to https://linux.die.net/man/1/qemu-img for more information on the qemu-img command

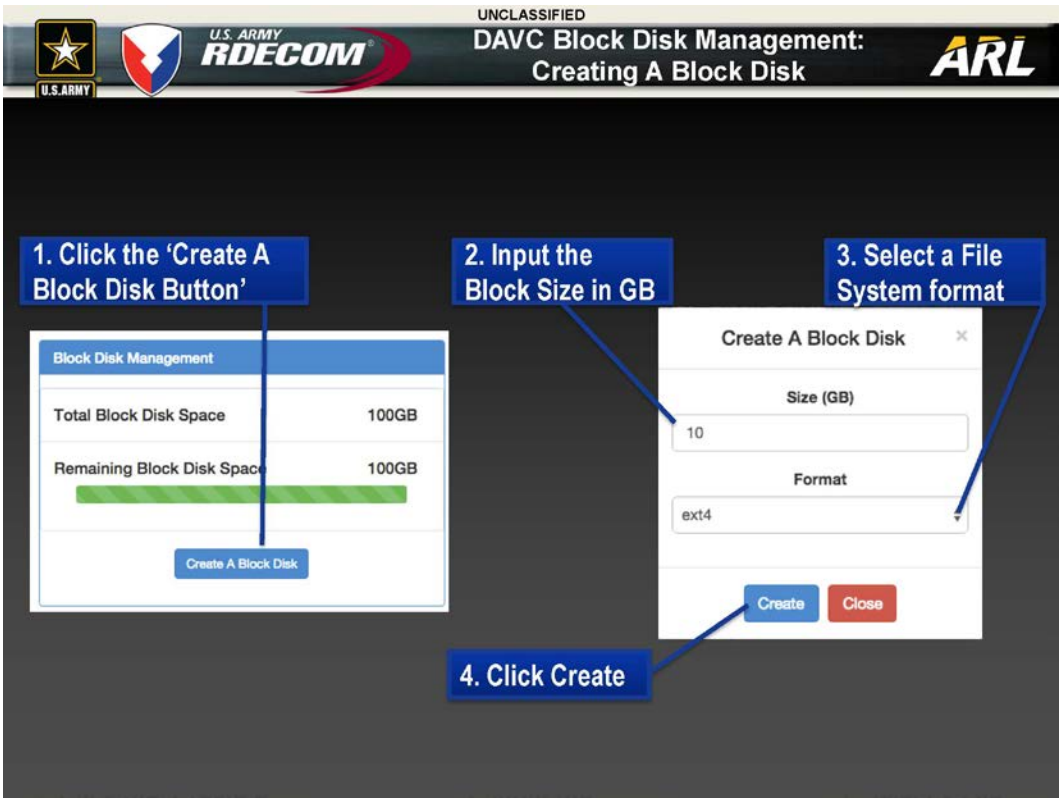

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC VHD Management: Uploading a VHD
ARL
Virtual Hard Disk Management
Add Virtual Hard Disk
1. Click 'Add Virtual Hard Disk Button'
2. Input a descriptive name
3. Input the VHD OS
4. Input the minimum Core and RAM requirements
5. Indicate if the VHD can be shared with other users
6. Browse for the VHD file (qcow2 format)
Add a Virtual Hard Disk
Virtual Hard Disk Name
EMANE_TEST_NODE
OS
Ubuntu14.04
Boot Type
Hyper Visor Type
kvm
Minimum Required Cores
2
Minimum Required Non-Persistent Block Disk Size (GB)
5
Minimum Required RAM (MB)
2048
Virtual Network Driver
virtio
Shared
File
Choose File
EMANE_TEST...tu14.qcow2
Upload VHD
Close
Boot Type, Hyper Visor Type and VNIC can be left at their defaults.
7. Click 'Upload VHD' when complete

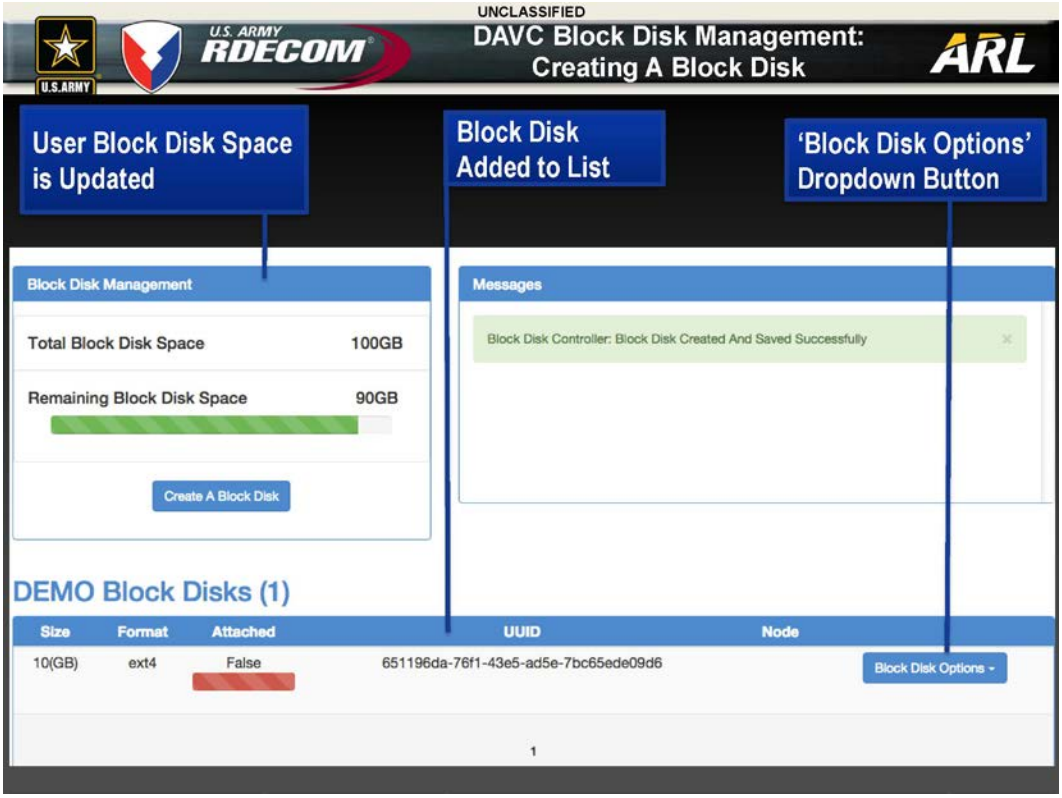

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC VHD Management
ARL
A system message will indicate the success or failure of the VHD upload.
Messages
Virtual Hard Disk EMANE_TEST_NODE uploaded successfully.
The VHD will not be available during cluster configuration until it has 'Synced' (copied) onto all host servers. This can take a while depending on the size of the VHD.
ID
Name
Owner
OS
Hypervisor
Size(GB)
Synced
1
EMANE_TEST_NODE
demo
Ubuntu14.04
kvm
26.0
False
VHD Options
ID
Name
Owner
OS
Hypervisor
Size(GB)
Synced
1
EMANE_TEST_NODE
demo
Ubuntu14.04
kvm
26.0
True
VHD Options

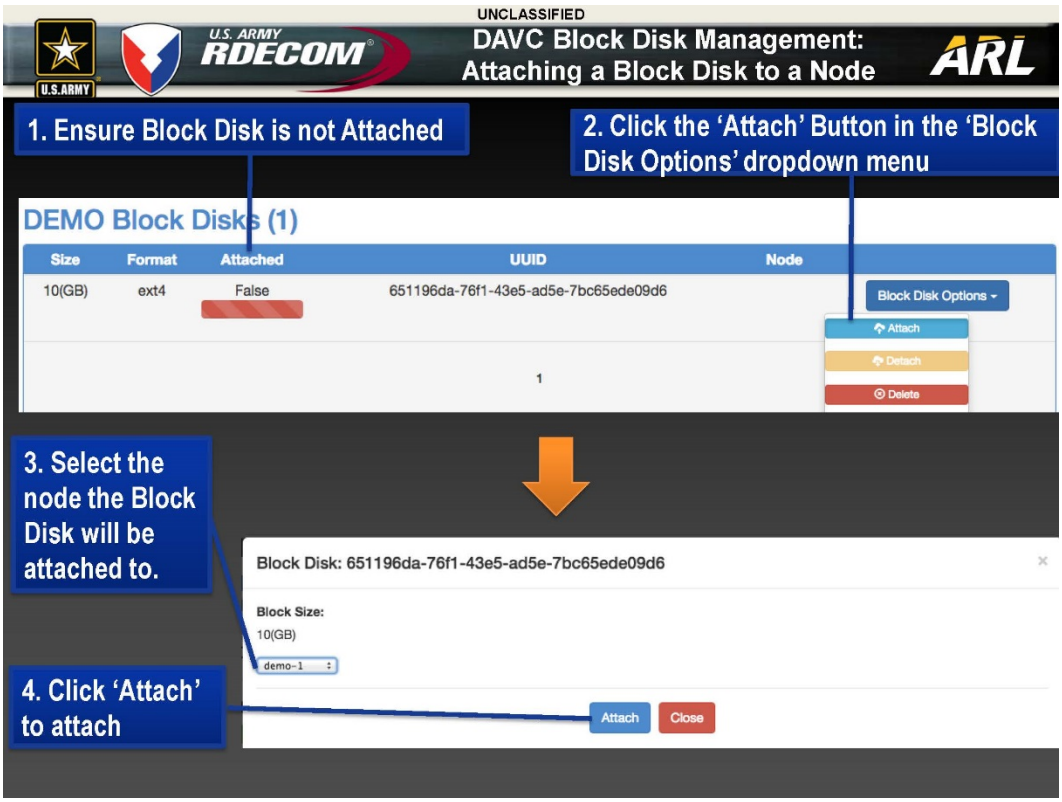
7. DAVC Block Disk/Persistent Storage Management

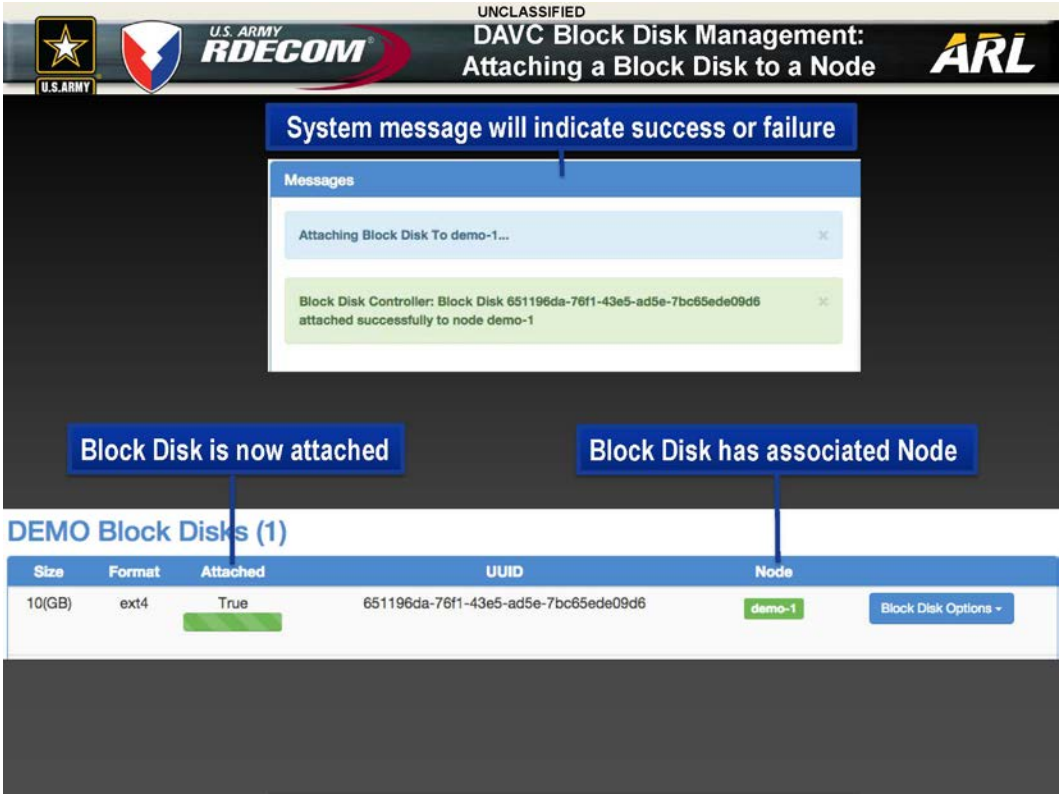


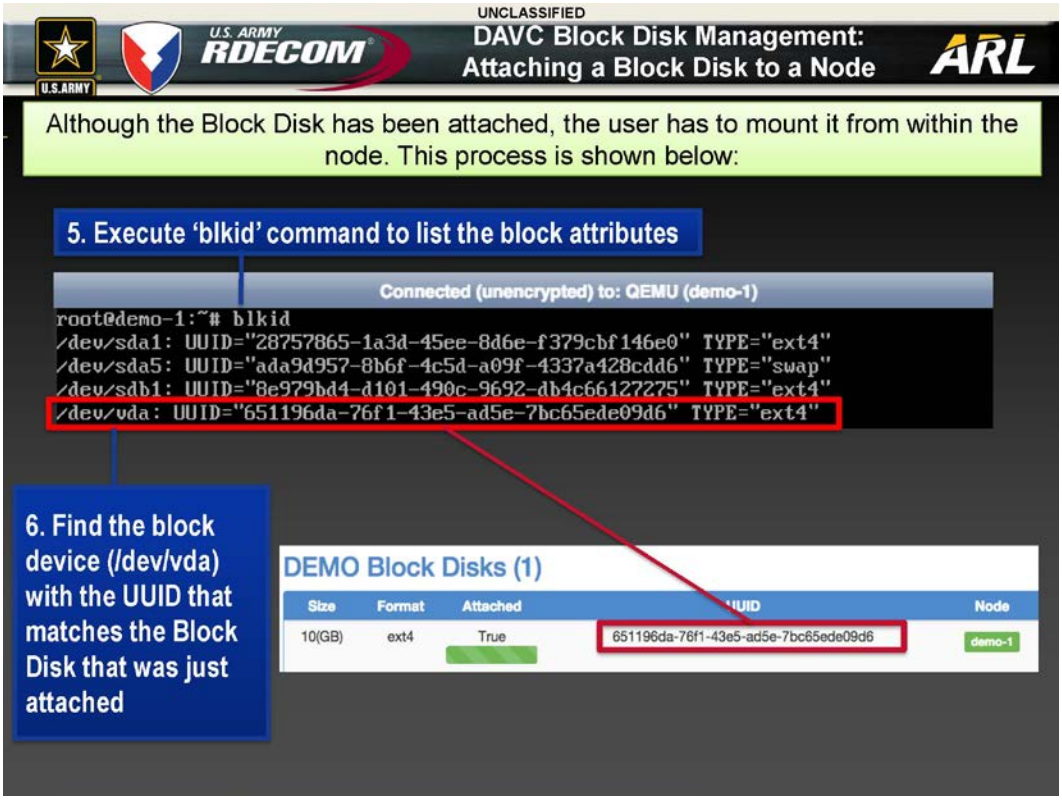

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management
ARL
Block Disk Space Usage
System Messages
Create A Cluster
My Clusters
Virtual Hard Disk Mngt
Block Disk Mngt
Usage Statistics
Logout
Block Disk Management
Total Block Disk Space 100GB
Remaining Block Disk Space 100GB
Create A Block Disk
Messages
Block Disk List
DEMO Block Disks (0)
Size
Format
Attached
UUID
Node
1
Create Block Disk Button

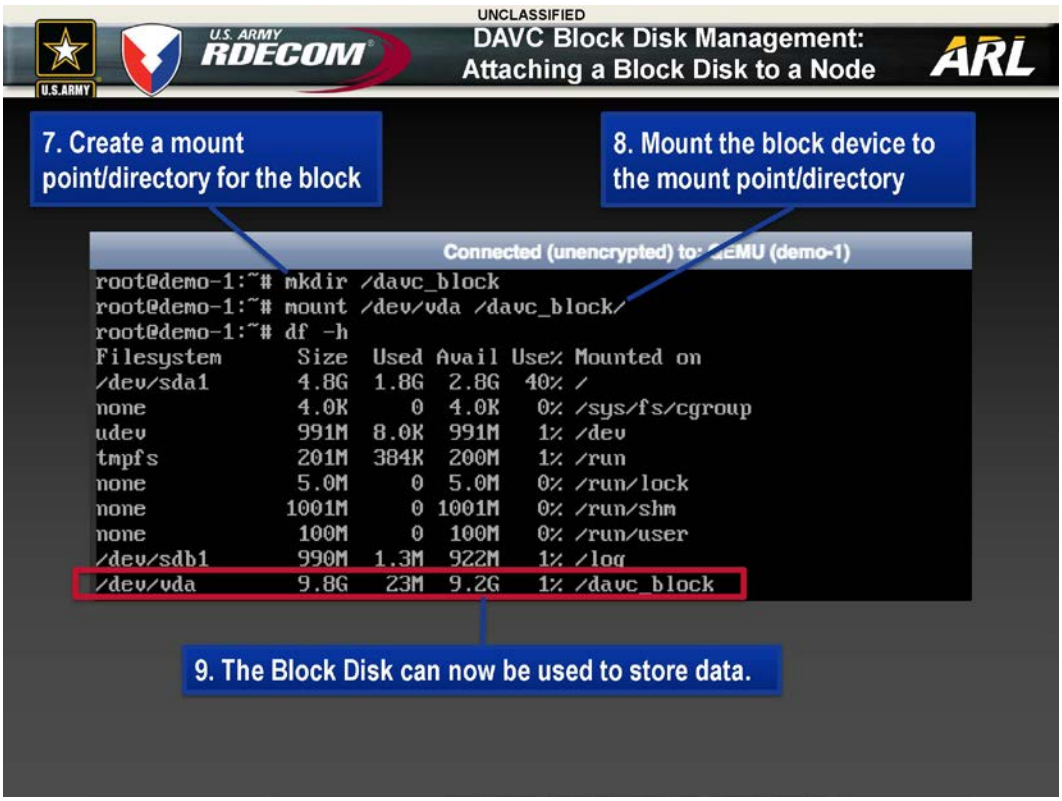

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management:
Creating A Block Disk
ARL
1. Click the 'Create A Block Disk Button'
2. Input the Block Size in GB
3. Select a File System format
Block Disk Management
Total Block Disk Space 100GB
Remaining Block Disk Space 100GB
Create A Block Disk
Create A Block Disk
Size (GB)
10
Format
ext4
Create
Close
4. Click Create

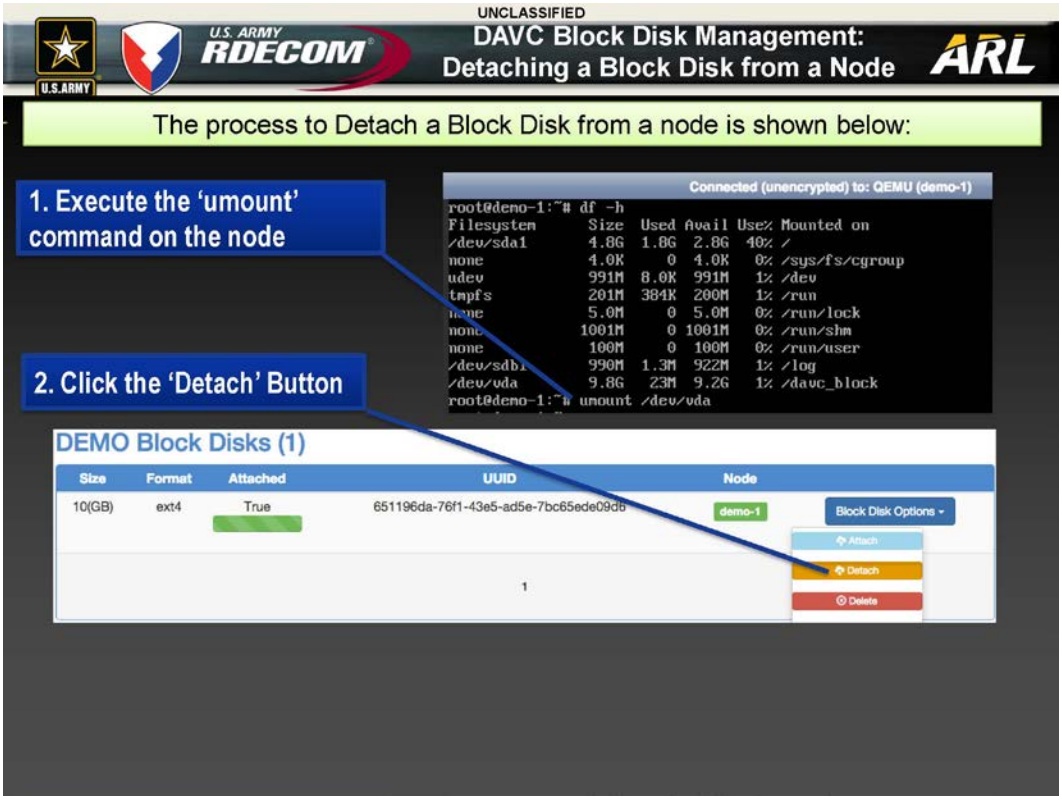

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management:
Creating A Block Disk
ARL
User Block Disk Space is Updated
Block Disk Added to List
'Block Disk Options' Dropdown Button
Block Disk Management
Total Block Disk Space 100GB
Remaining Block Disk Space 90GB
Create A Block Disk
Messages
Block Disk Controller: Block Disk Created And Saved Successfully
DEMO Block Disks (1)
Size Format Attached UUID Node
10(GB) ext4 False 651196da-76f1-43e5-ad5e-7bc65ede09d6
Block Disk Options
1

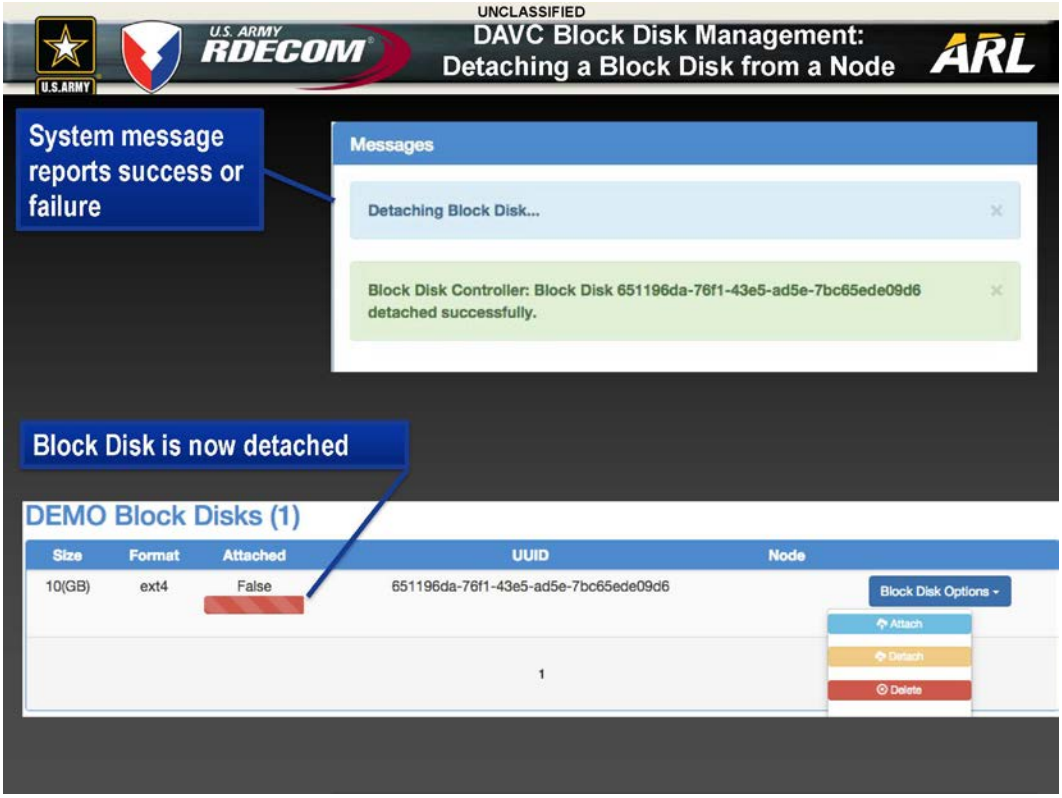

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management:
Attaching a Block Disk to a Node
ARL
1. Ensure Block Disk is not Attached
2. Click the 'Attach' Button in the 'Block Disk Options' dropdown menu
DEMO Block Disks (1)
Size Format Attached UUID Node
10(GB) ext4 False 651196da-76f1-43e5-ad5e-7bc65ede09d6
Block Disk Options
Attach
Detach
Delete
1
3. Select the node the Block Disk will be attached to.
4. Click 'Attach' to attach
Block Disk: 651196da-76f1-43e5-ad5e-7bc65ede09d6
Block Size:
10(GB)
demo-1
Attach
Close


UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management:
Attaching a Block Disk to a Node
ARL
System message will indicate success or failure
Messages
Attaching Block Disk To demo-1...
Block Disk Controller: Block Disk 651196da-76f1-43e5-ad5e-7bc65ede09d6 attached successfully to node demo-1
Block Disk is now attached
Block Disk has associated Node
DEMO Block Disks (1)
Size
Format
Attached
UUID
Node
10(GB)
ext4
True
651196da-76f1-43e5-ad5e-7bc65ede09d6
demo-1
Block Disk Options

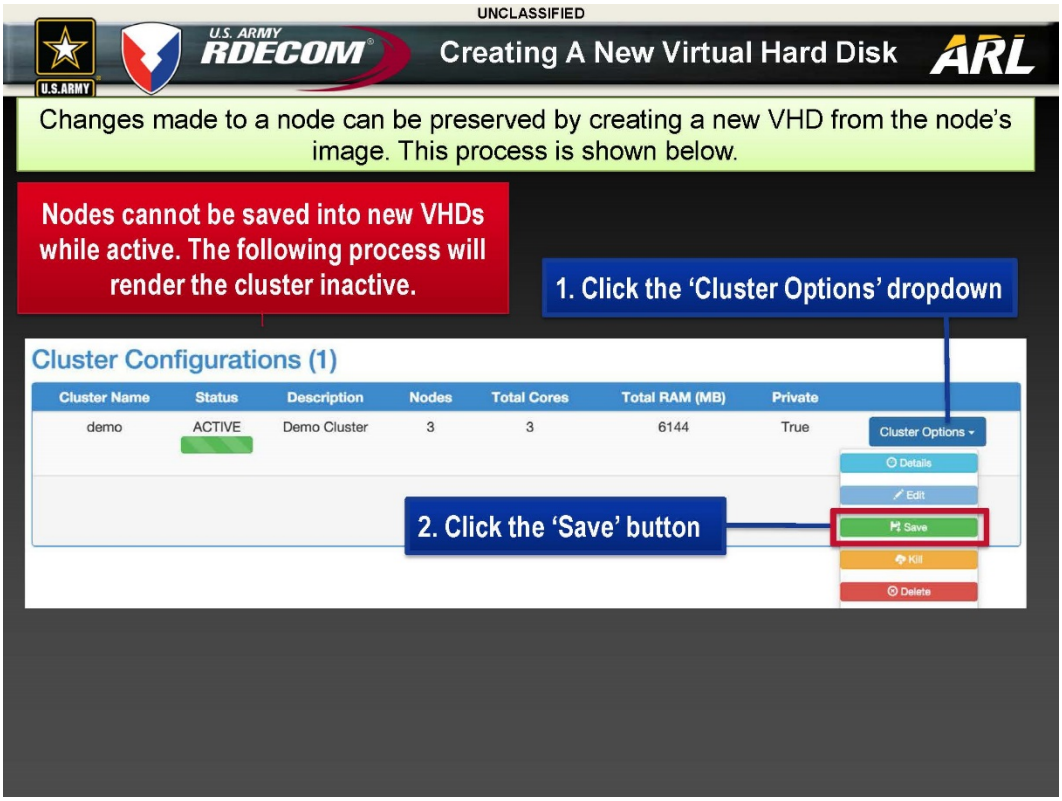

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management:
Attaching a Block Disk to a Node
ARL
Although the Block Disk has been attached, the user has to mount it from within the node. This process is shown below:
5. Execute 'blkid' command to list the block attributes
Connected (unencrypted) to: QEMU (demo-1)
root@demo-1:~# blkid
/dev/sda1: UUID="28757865-1a3d-45ee-8d6e-f379cbf146e0" TYPE="ext4"
/dev/sda5: UUID="ada9d957-8b6f-4c5d-a09f-4337a428cdd6" TYPE="swap"
/dev/sdb1: UUID="8e979bd4-d101-490c-9692-db4c66127275" TYPE="ext4"
/dev/vda: UUID="651196da-76f1-43e5-ad5e-7bc65ede09d6" TYPE="ext4"
6. Find the block device (/dev/vda) with the UUID that matches the Block Disk that was just attached
DEMO Block Disks (1)
Size
Format
Attached
UUID
Node
10(GB)
ext4
True
651196da-76f1-43e5-ad5e-7bc65ede09d6
demo-1

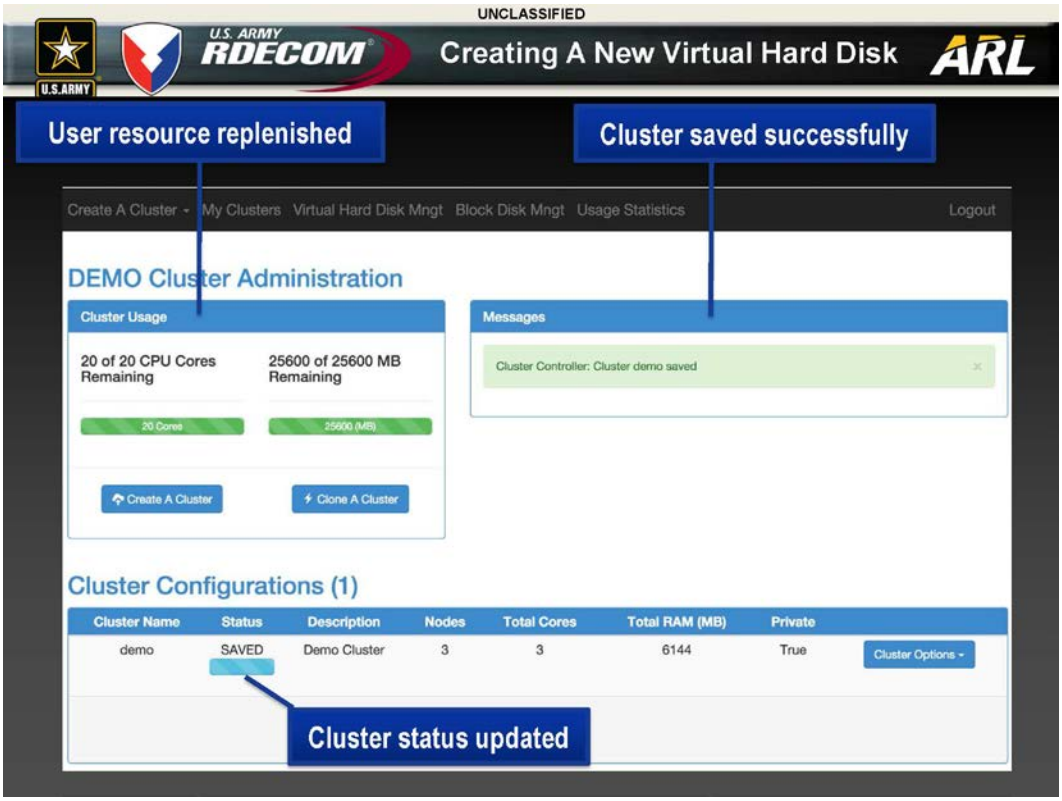

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management:
Attaching a Block Disk to a Node
ARL
7. Create a mount point/directory for the block
8. Mount the block device to the mount point/directory
Connected (unencrypted) to: QEMU (demo-1)
root@demo-1:~# mkdir /davc_block
root@demo-1:~# mount /dev/vda /davc_block/
root@demo-1:~# df -h
Filesystem Size Used Avail Use% Mounted on
/dev/sda1 4.8G 1.8G 2.8G 40% /
none 4.0K 0 4.0K 0% /sys/fs/cgroup
udev 991M 8.0K 991M 1% /dev
tmpfs 201M 384K 200M 1% /run
none 5.0M 0 5.0M 0% /run/lock
none 1001M 0 1001M 0% /run/shm
none 100M 0 100M 0% /run/user
/dev/sdb1 990M 1.3M 922M 1% /log
/dev/vda 9.8G 23M 9.2G 1% /davc_block
9. The Block Disk can now be used to store data.

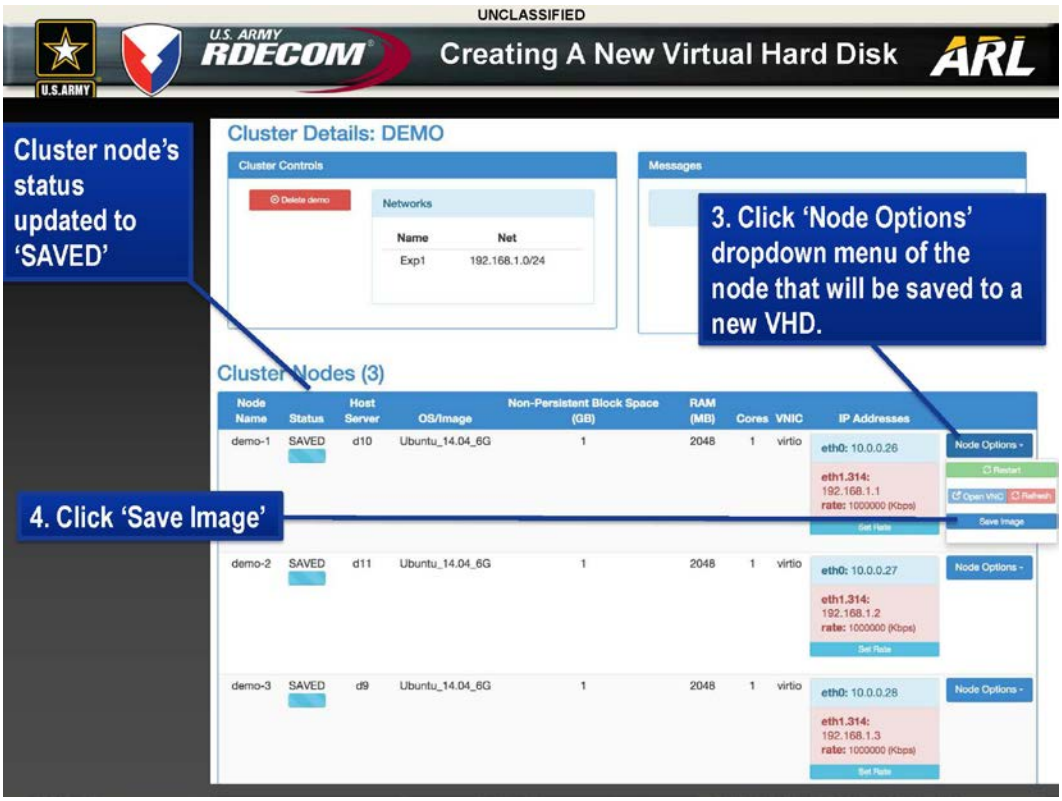

UNCLASSIFIED
U.S. ARMY RDECOM
DAVC Block Disk Management:
Detaching a Block Disk from a Node
ARL
The process to Detach a Block Disk from a node is shown below:
1. Execute the 'umount' command on the node
2. Click the 'Detach' Button
Connected (unencrypted) to: QEMU (demo-1)
root@demo-1:~# df -h
Filesystem Size Used Avail Use% Mounted on
/dev/sda1 4.8G 1.8G 2.8G 40% /
none 4.0K 0 4.0K 0% /sys/fs/cgroup
udev 991M 8.0K 991M 1% /dev
tmpfs 201M 384K 200M 1% /run
none 5.0M 0 5.0M 0% /run/lock
none 1001M 0 1001M 0% /run/shm
none 100M 0 100M 0% /run/user
/dev/sdb1 990M 1.3M 922M 1% /log
/dev/vda 9.8G 23M 9.2G 1% /davc_block
root@demo-1:~# umount /dev/vda
DEMO Block Disks (1)
Size
Format
Attached
UUID
Node
10(GB)
ext4
True
651196da-76f1-43e5-ad5e-7bc65ede09d8
demo-1
Block Disk Options
Attach
Detach
Delete
1

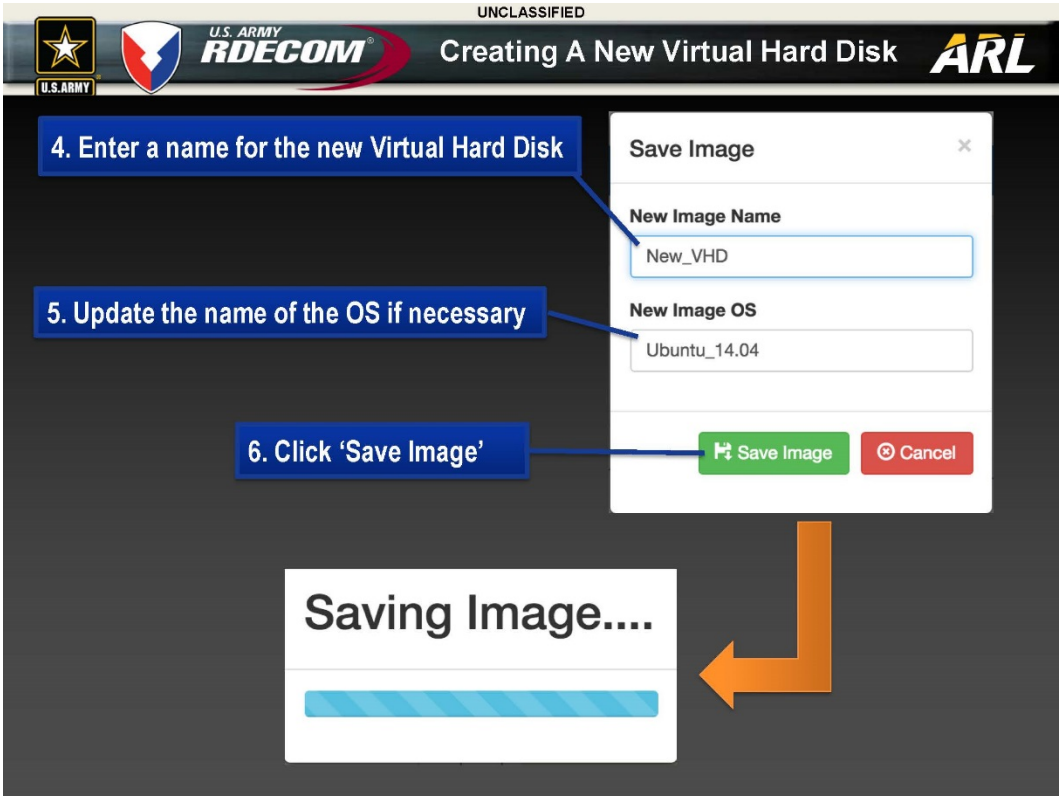


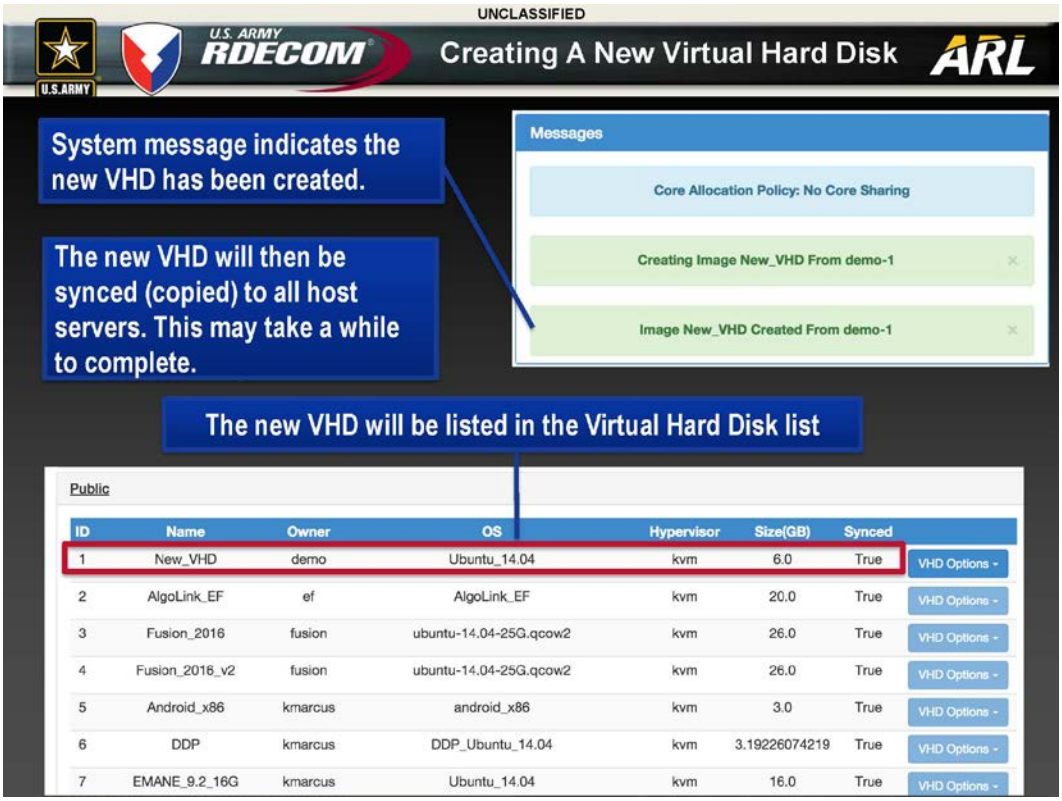
8. Creating a New Virtual Hard Disk from a Cluster Node

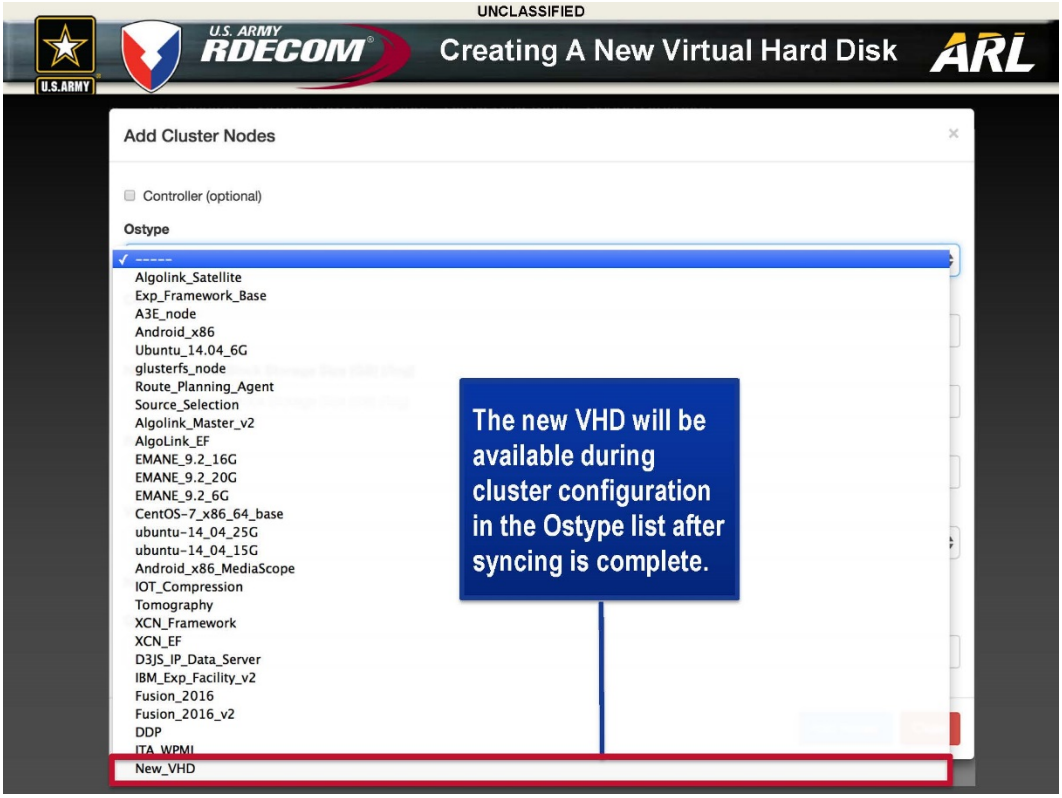



UNCLASSIFIED
U.S. ARMY RDECOM
Creating A New Virtual Hard Disk
ARL
User resource replenished
Cluster saved successfully
Create A Cluster
My Clusters
Virtual Hard Disk Mngt
Block Disk Mngt
Usage Statistics
Logout
DEMO Cluster Administration
Cluster Usage
20 of 20 CPU Cores Remaining
25600 of 25600 MB Remaining
20 Cores
25600 (MB)
Create A Cluster
Clone A Cluster
Messages
Cluster Controller: Cluster demo saved
Cluster Configurations (1)
Cluster Name
Status
Description
Nodes
Total Cores
Total RAM (MB)
Private
demo
SAVED
Demo Cluster
3
3
6144
True
Cluster Options
Cluster status updated


UNCLASSIFIED
U.S. ARMY RDECOM
Creating A New Virtual Hard Disk
ARL
Cluster node's status updated to 'SAVED'
Cluster Details: DEMO
Cluster Controls
Networks
Name Net
Exp1 192.168.1.0/24
Messages
3. Click 'Node Options' dropdown menu of the node that will be saved to a new VHD.
Cluster Nodes (3)
Node Name Status Host Server OS/Image Non-Persistent Block Space (GB) RAM (MB) Cores VNIC IP Addresses
demo-1 SAVED d10 Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.0.26 eth1.314: 192.168.1.1 rate: 1000000 (Kbps)
demo-2 SAVED d11 Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.0.27 eth1.314: 192.168.1.2 rate: 1000000 (Kbps)
demo-3 SAVED d9 Ubuntu_14.04_6G 1 2048 1 virtio eth0: 10.0.0.28 eth1.314: 192.168.1.3 rate: 1000000 (Kbps)
Node Options
4. Click 'Save Image'


UNCLASSIFIED
U.S. ARMY RDECOM
Creating A New Virtual Hard Disk
ARL
4. Enter a name for the new Virtual Hard Disk
5. Update the name of the OS if necessary
6. Click 'Save Image'
Save Image
New Image Name
New_VHD
New Image OS
Ubuntu_14.04
Save Image
Cancel
Saving Image....


UNCLASSIFIED
U.S. ARMY RDECOM
Creating A New Virtual Hard Disk
ARL
System message indicates the new VHD has been created.
The new VHD will then be synced (copied) to all host servers. This may take a while to complete.
Messages
Core Allocation Policy: No Core Sharing
Creating Image New_VHD From demo-1
Image New_VHD Created From demo-1
The new VHD will be listed in the Virtual Hard Disk list
Public
ID Name Owner OS Hypervisor Size(GB) Synced
1 New_VHD demo Ubuntu_14.04 kvm 6.0 True VHD Options
2 AlgoLink_EF ef AlgoLink_EF kvm 20.0 True VHD Options
3 Fusion_2016 fusion ubuntu-14.04-25G.qcow2 kvm 26.0 True VHD Options
4 Fusion_2016_v2 fusion ubuntu-14.04-25G.qcow2 kvm 26.0 True VHD Options
5 Android_x86 kmarcus android_x86 kvm 3.0 True VHD Options
6 DDP kmarcus DDP_Ubuntu_14.04 kvm 3.19226074219 True VHD Options
7 EMANE_9.2_16G kmarcus Ubuntu_14.04 kvm 16.0 True VHD Options



9. Conclusion

This report displayed the step-by-step instructions to perform common DAVC version 2.0 operations to access DAVC and manage DAVC clusters, nodes, virtual hard disks, and persistent block storage.

1 (PDF) DEFENSE TECHNICAL INFORMATION CTR DTIC OCA

2 (PDF) DIRECTOR US ARMY RESEARCH LAB RDRL CIO L IMAL HRA MAIL & RECORDS MGMT

1 (PDF) GOVT PRINTG OFC A MALHOTRA

2 (PDF) DIRECTOR US ARMY RESEARCH LAB ATTN RDRL CIN T B RIVERA K MARCUS

1 (PDF) NORWEGIAN DEFENCE RESEARCH ESTABLISHMENT (FFI) ATTN M HAUGE

INTENTIONALLY LEFT BLANK.